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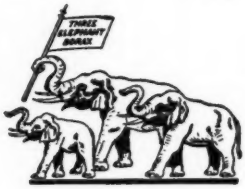

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R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXIX NO. 4

TABLE OF CONTENTS, APRIL, 1945

Home State Stuff 3
Jeff Sees the Good and Bad in It

Ladino Clover Makes A Record 6
As Related by Ford S. Prince

Fertilizing Golf Greens 9
Discussed by G. N. Hoffer

Idle Acres in the Southeast Can Be Put to Work 13
T. S. Buie Explains How

Yield and Quality of Cotton Can Be Improved by Boron 18
According to Russell Coleman

New Ideas in Haymaking from New York Farmers 21
Are Presented by I. R. Bierly & A. F. Gustafson

The Effectiveness of Phosphate Fertilizer 25
Analyzed by H. J. Snider

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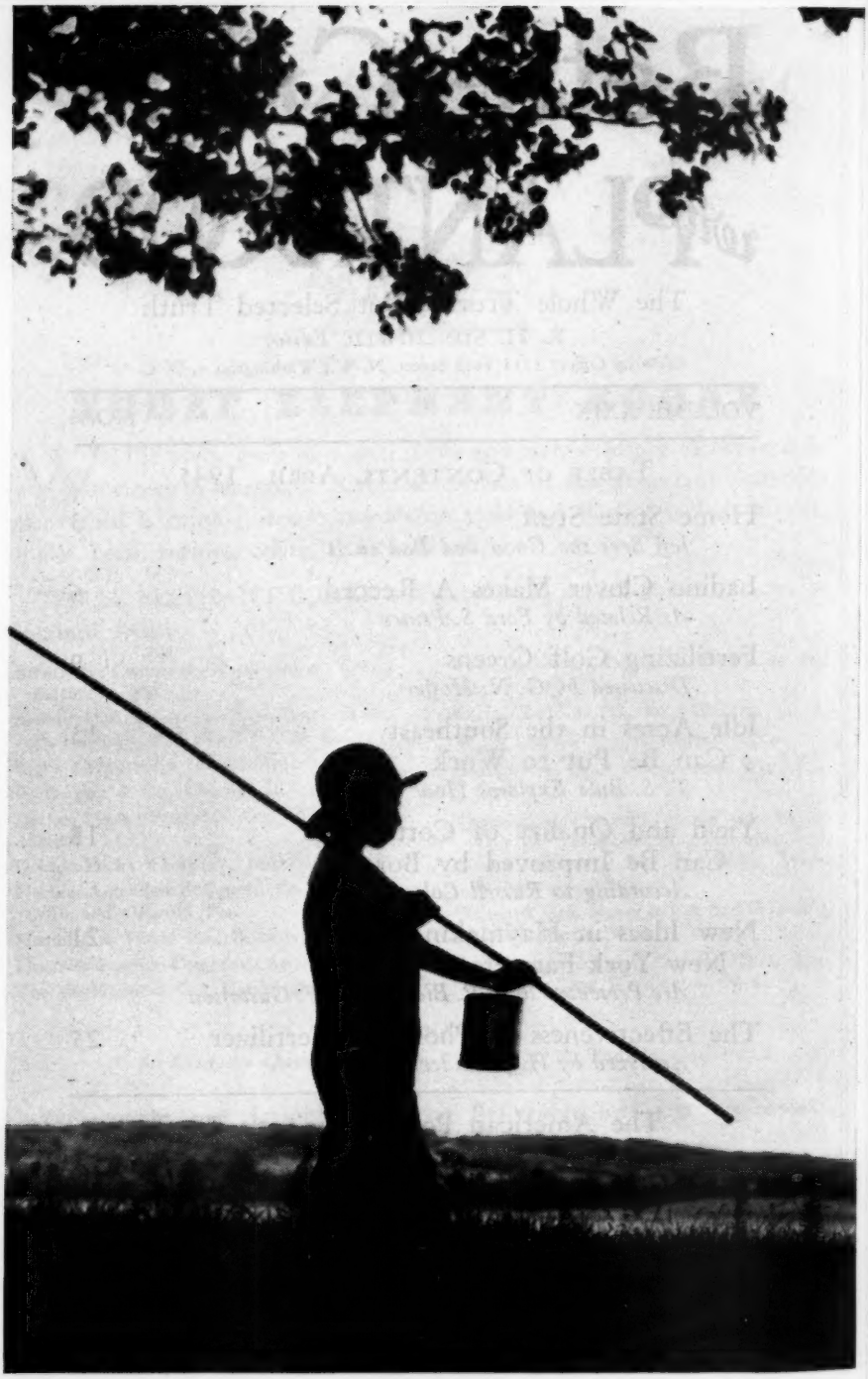

SPRING SILHOUETTE

Better Crops with PLANT FOOD

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Vol. XXIX WASHINGTON, D. C., APRIL 1945 No. 4

There's Justifiable Pride in . . . . . .

Home State Stuff

Jeff McDermid

STATE pride, and the nostalgia inseparable from it in one who has it deeply ingrained, is a sort of mental cement which is as much responsible for federal unity and true democracy as anything you can put your finger on in America. Even in the face of a growing nationalism and the social standardization lately experienced here, we still boast a degree of sectionalism which makes all the old state anthems merge into one chorus of close communion. As a kid you get it first in the form of folklore, old rhymes, local traditions and anecdotes, things they told you before you were knit too uniformly by our common pattern and influenced too strongly by the ease of modern transportation and communication.

This state pride stuff which we all strut on occasion has its serious and owly side as well as its moments of comic rivalry and banter. And again when groups of people meet in lands remote from their origin, the state feeling melts a little and then blends in a sort of emulsified sectional spirit. At such times a neighboring state looms larger in your affections because it belongs to the familiar old design for living you once knew and enjoyed so well.

State pride rests upon local content, local happiness, local achievement, local scenery, and local tradition and history. It would not be true to say that state pride springs from the grass roots, because no grass sprouts in many a square mile of bricks and pavements, which are fondly regarded by the ward gangs and teen-agers who never saw a green thing growing.

Local content is wholly a mystery to strangers, tourists, and such casual visitors who forget certain shortcomings

in the land they hail from. Local content has its advantages just as marked as its glaring defects. Local content is endorsed by old-timers who resist change and innovation, as well as by certain types of elected officers whose duty appears to be to make the background of their own importance keep its stability and smugness.

Some towns still have hitching posts and watering troughs, and one village board refused a donation for a recreation hall because they said the kids for generations had always played in the fields and along the river bank.

REFORMERS and improvers often meet difficulty in advancing the cause of progress against this inertia. "Do-good" dames and uplift groups and the project chairmen of Rotary, Lions, and Kiwanis have no end of bother about this. Their first hurdle is to think up a good local improvement and the second one is to sell the idea after it is sufficiently "thunk up."

Much fun has been poked at these so-called homeopathic remedies for what ails a community, and some of our best paid novelists have debunked the Babbits among us. Nevertheless, I recall the times when we had no such devoted clubs to gather weekly at the local hotel and about the only reform we met up with was the periodic reform of the soaks and topers.

From a recent book I read about the private life and community interests of Paul Revere and his satellites, and from conversation with a Boston expert a few years ago, I have the suspicion that Mr. Revere was a rough and ready prototype of the modern service club leader. I do not refer to his hoss-back cantering exploit, but rather to the series of escapades and group activities that preceded it and made life a turmoil for all who did not subscribe to the Sons of Liberty.

It has been found true frequently that the power and pressure exerted by unofficial mobs and conspirators upon the uplift and awakening of a community are more potent and fruitful than many long and prosy sessions of the town selectmen.

Moreover, your canny town official knows it too, and he often partakes on the side in these sub rosa affairs and roundtable reforms which his more conspicuous position denies him.

After all, local content feeds upon improvements because modern hustling competition forces the issue, and no community remains very long serene and smug if a rival trading center gets organized to yank itself out of mud and sloth. Content isn't a good cement for democracy unless it has plenty of pride mixed with it.

Pride in local progress, like patriotism, has to have some action and somebody willing to sidetrack his own affairs, if necessary, to push it through. I like the fellow who backslaps his way around boosting hard to erect one more thing for his locality to be content about. I know some rich rural sections that have gone long on selfish individual improvements and sold themselves short on a decent trading center or educational equipment.

OF course the more new things we get to be content over and share mutually, the greater will be the spur to have more of them. So that's what I mean by local content as one of the elements of democracy and national spirit.

Local happiness is the home-made way of enjoying simple leisure. It is usually thought of as being dependent upon the existence there of lively leadership, imaginative zest, and community responsiveness. The growth of fraternal, juvenile, and musical and literary societies and neighborhood social groups, as well as service clubs devoted to war work, has drawn folks together at a time when the home radio and the free public library tended to keep each family by its own fireside.

The noble old art of being willing to entertain through the whole gamut of things, from whanging a jews-harp or wriggling your ears to songs, practical jokes, and recitations or ghost

stories, began to take a back seat about the time I became the responsible head of a family. I should not have been thus reticent and retiring, as my youth was spent with elders who made a lot out of a little.

My father delighted in reciting Civil War yarns, real and embellished, or singing old English hunting songs with a loud "rippa tipp ten" chorus. My uncle played the fiddle, teasing out such shrill tunes as Money Musk, Turkey in the Straw, and Hell Among the Yearlings. A cousin posed on his own say-so as a card expert and trickster, and he could make a queen appear in as many places at once as Eleanor Roosevelt. Still another close relative specialized in funny stories, some of them being the kind we had to "shush him" about when they came too close to the color line. I doubt if Duffy's Tavern or the Kraft Hour or anything of Bob Hope's satisfies youngsters today any more than those leisure hours long ago tickled the generation that drank them in.

Preparations for smaller gatherings then included the cider jug, the corn-popper, and the checker-board. I became an adept at the first two, but never beat my Dad a single game in ten long years of trying to race him to the king row.

Even with this rich experience as a starter, I never became very handy at leading home frolics or acting as the master of domestic revels. When I tried it the kids and some of the elders would drown me out with popular radio and victrola selections. They were not unkind, only doing what was customary and desirable, sticking to canned entertainment such as the more modern community came to rely upon in a progressive era.

In the same fashion I found to my consternation that the cider jug gave way to the cola bottle, the corn-popper became a candy bar from the drug-store and the old checker-board duet went out when the foursomes at the folding table took the town by storm.

However the moods and methods of entertainment may change, we must remember that local happiness of which we speak depends on other things than joy and laughter. I take it that your sound community which is to become a foundation for safety in our union must look to the health and morality of its people no less than be able to excite their risibility and banish their cares.

I must not tinker too closely with this health proposition, as there are numerous cults and movements afoot with untried plans and hopeful dreams about doctors and nurses and hospitals. Without getting too technical and starting to map out directions for preventing ills and curing people right and left, I am sure we can all agree that too vast an area of our countryside neglects private and public health promotion. I feel that we are getting "set" to tackle this prime motive for welfare in a very thoughtful, cooperative, and intelligent way, and that when the soldiers and sailors return to us we will move even faster at it.

So far, I have only noted two or three states which put out paid advertising to boost their absolutely healthful climate, where illness is unknown

(*Turn to page* 51)

Roe MacDanold's farm, North Haverhill, New Hampshire, has rotated pastures with temporary fences. On left seeded in 1942, pastured 1942-43, hayed in 1944. On right, seeded in 1943 and pastured in 1943-44.

Ladino Clover Makes A Record

By Ford S. Prince

Agronomist, Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire

I FEEL more or less responsible for bringing the name of Roe MacDanolds into the limelight. Not that it gives me a guilty feeling. For back of it all is Mr. MacDanolds himself who said, when I visited him early in 1944, "I wish you would find out why it is that I can produce milk on a grain-milk ratio of 1:10 when most farmers in New Hampshire are averaging to feed 1:3 or even a narrower ratio than that?"

I was naturally a little startled at this 1:10 business (actually it averaged 1:10.7 for the entire season of 1943) for I had never known any of our good dairymen doing better than 1:6. Some of our oldest cow-testing associations feed as narrow a ratio as 1:2.7 as an average for the whole year. Since I have been doing extension work for many years and talking to dairymen about the tremendous amount of their combined grain bill, not that they haven't been conscious of it all along, MacDanolds' statement interested me in an unusual manner.

Upon further questioning I found that when his cows were on Ladino pasture, of which he now has an ample acreage, he fed only a pound of grain to 25 of milk. This means that unless a cow was in flush milk while on pasture she got very little or no grain. His barn feeding averaged 1:6 or thereabouts. He then made the further astonishing statement that he hadn't opened his silo until mid-January because he hadn't felt the need for it.

I had always known that Roe MacDanolds was up amongst the leaders

in Dairy Herd Improvement Association work in New Hampshire. Upon inquiry I found he has had the highest producing herd in 11 out of the last 13 years. So I asked how his cows performed with so little grain, to find they did over 13,000 lbs. of milk in 1943, which represented an increase of almost 1,000 lbs. over 1942 when his grain-milk ratio was 1:5.4. He led the Herd Improvement Associations in both years, as a matter of fact.

Now, if you stop to figure it out, it takes only a little over 1,200 lbs. of grain to produce 13,000 lbs. of milk on a 1:10.7 ratio, but on a 1:5.4 ratio it takes about 2,400 lbs.—a difference of 1,200 lbs. To produce this amount of milk on a 1:3 ratio which, as I have said, is about the average of our herd improvement associations, it takes over 4,300 lbs., or 3,100 lbs. more than Roe's 1943 figure. At $60 a ton this amounts to $93 difference in purchased feed cost per cow.

Not long after I came into possession of these figures I was asked to attend a meeting in Springfield, Massachusetts, and discuss the question of how we could best meet the grain shortage, before a group of agronomists and fertilizer and feed men. This is where I started the ball rolling which gave Mr. MacDanolds some publicity. Mentioning his name, I contrasted his grain feeding with the amounts fed by some of our other dairymen, such as I have here. This I tied up with his roughage program and especially with Ladino clover which he is using to his great advantage; but as many other farmers with as large a proportion of Ladino clover are still on the old 1:3 grain-milk ratio, I pointed out that here was one man who was capitalizing on the fact that he had good pasture and hay whereas many others had failed to do so.

Later on in a State War Board meeting in Durham, New Hampshire, I mentioned these facts again and carried the analogy still further by presenting figures as to how many less cars of grain would need to be shipped into and consumed in New Hampshire if all our dairymen were on a 1:10 basis. This latter session resulted in calling a summer meeting at the MacDanolds' farm attended by farmers from all over the state, as well as by extension workers and A.A.A. officials, many of whom had come up from Washington for the event.

We went out into the pastures at this

Cows in Ladino clover pasture on MacDanold's farm.

August meeting, looked at MacDanolds' barns full of excellent hay, and heard him tell his story. Most of the farmers there had their fingers crossed. Not that they didn't believe the story Roe told. They saw the Ladino pastures and the management they received. They saw the kind of forage he grew. But even then they didn't think he could do it again.

But he has. Recent word indicates he is keeping his grain about on the 1943 level. And this winter he doesn't even plan to open his silo. This means he has completed two full years on an average grain-milk ratio wider than 1:10 and is still going strong—strong enough, in fact, so that he doesn't need silage. Now a great many dairymen are asking themselves, "What has Roe MacDanolds got that I have not?"

Why is he able to continue to lead in herd production using only a third as much grain as others? Four fundamental things stand out in the MacDanolds system of farming. It would be difficult to say which is most important. He is making full use of Ladino clover as pasture. He is tremendously interested in pasture management, taking his cows out of Ladino when it is at a height at which most farmers would turn into it. And, he is especially concerned with soil fertility, using some of the money he would otherwise spend for grain and putting it into fertilizers and lime. Finally, he pastures his seedings the first two years while they are flush with clover, making hay on them when the proportion of grass is undoubtedly higher, although easier to make but not so nutritious as pasture.

These are the four principal reasons why he is succeeding with his present program. There are other reasons, too, reasons which can perhaps best be explained by the fact that he has that rare combination of being a good cowman and a good crops-man at one and the same time.

Tillage land serves for both pasture and hay on the MacDanolds farm. He is "all through" keeping his cows in a poor permanent pasture where, when he did so, he had to full grain-feed all summer long. His 70 acres of tillage land furnish enough pasture, hay, and (when he needs it) silage for 21 Holstein cows and the normal complement of young stock. These acres were productive enough in 1942 so that he carried his herd and sold 50 tons of hay. Forty tons of hay were sold in 1943. This means his acres are productive enough so that two of them will feed one cow or animal unit all the roughage it needs for the entire year.

The Ladino program was started in 1941 when 17 acres were seeded. Twenty-five acres were seeded in 1942; 11 acres in 1943, and 10 in 1944, making a total of 63 acres on a 70-acre farm. It was not until 1943, with 50 acres of Ladino, that the full effect of this crop was noted. With plenty of Ladino, there are no short pasture periods and no slumps in production to overcome.

Fertilizer Schedule

Mr. MacDanolds practices a rather unique method of seeding, well suited to his level farm. The land is fitted, fertilized, and limed in the fall. The seed is sown in the spring just as the frost is coming out of the ground. He applies a ton of lime per acre every five or six years, just before seeding. His fertilizer schedule prior to seeding consists of 500 lbs. of 20 per cent superphosphate, 200 lbs. of muriate of potash, and nitrogen in some form equal to 200 lbs. nitrate of soda or 150 lbs. of sulphate of ammonia. His seeds mixture consists of 2 lbs. of Ladino, 4 of red clover, and 6 of timothy per acre, which is about half as much as is usually used on an acre.

First-year seedings are top-dressed in the summer for pasture the following year with a superphosphate-potash mixture analyzing 0-23-30 at the rate of 250 lbs. per acre. During the next three years, or when the land is hayed, manure is used as a top-dressing at the

(*Turn to page* 40)

A tractor, moving backwards, draws and helps to guide the turf cutter across the green. Green No. 17, Elks Country Club, Lafayette, Indiana.

Fertilizing Golf Greens

By G. N. Hoffer

Lafayette, Indiana

DURING the Midwest Greenkeepers Short Course at Purdue University, February 26-28, 1945, the writer described the methds used in fertilizing and aerating the greens on the Elks Country Club course at Lafayette, Indiana. Since then requests have been received for additional information. The following outline of the methods used is offered, not as any official recommendation from Purdue, but merely as a convenient reference for the possible guidance of others who may wish to try the treatments on their own golf course.

Greens Turf Requires Careful Management

It was pointed out that the fertilization of golf greens required much more care and effort than fertilizing fairways or even the tees. The grass on the greens is kept trimmed very short in comparison to that on the fairways. The clippings are removed from the greens and this represents a constant loss of fertility, while they remain on the fairways to decompose and maintain the fertility. Because of this treatment of the greens turf, which keeps the plants relatively small in size, the nutrient relation between the grass shoots and roots is much more delicately balanced than that which occurs in fairway grasses where larger growths of leaves can provide more nourishment for larger root systems. Accordingly, the diminutive grasses on greens should be fed frequently with properly balanced supplies of fertilizing nutrients. All precautions must be taken to not over-feed or damage the grass in any

way with the applied chemicals. The method used for the past several years at the Elks Country Club has been to apply fertilizing materials only when dissolved in water and sprayed under pressure from a tank onto the greens and washed in immediately.

Chemical Tests on Clippings Guide Treatments

The amounts and kinds of fertilizing materials for each treatment are determined by rapid chemical tests on the grass clippings. By this procedure any approaching deficiencies of nitrogen, phosphate, and/or potash are detected long before any deficiency symptoms appear. The fertilizer treatments are thus adjusted to the immediate needs of the grass at all times during the entire growing season.

After this system of fertilizing greens is once established, the time required for making the chemical tests of the clippings is very short. Samples of clippings from two or three greens will suffice unless some special problems, such as drainage, shaded locations, and others, may upset the usual routine on certain greens. The clippings are tested weekly as a routine practice.

At the Elks Club it requires the time of two men for four hours to fertilize 18 playing greens and one practice green by this method of fertilization. Dependent on the results of the tissue tests, the greens are fertilized every 8 to 14 days during the season.

Chemicals Required for Testing Clippings

The chemicals supplied in the Purdue Test Kit * are used in testing the grass clippings for nitrate, phosphate, and potash. The technique, however, which is used at the Elks Club and described in this article, requires the use of small bottles with droppers for convenience in making the tissue tests. Obtain four one-ounce dropping bottles and transfer the Purdue Phosphate Reagent No. 1, the Potash Reagents No. 1 and 2, respectively, to these dropping bottles. The nitrate-test solution already is in a dropping bottle. Then place approximately one fourth of the phosphate-powder reagent, No. 2, into one of the bottles (1 oz.) and dissolve the powder in distilled water.

You will then have the following test solutions in dropping bottles for convenient use:

1. Nitrate Test Solution (Diphenylamine in sulphuric acid)
2. Phosphate Test Solution (1-Molybdic-acid extracting solution)
3. Phosphate Test Solution (2-Dissolved powder-stannous oxalate)
4. Potash Test Solution (1-Cobaltinitrite solution)
5. Potash Test Solution (3-Ethyl alcohol).

In describing the methods used for making the various tests, the solutions will be referred to by the numbers above. Label the dropping bottles to coincide with them. (The procedures for preparing these solutions are described in Purdue Circular No. 204, "The Use of Rapid Chemical Tests on Soils and Plants As Aids in Determining Fertilizer Needs", April, 1939, by Thornton, Conner, and Fraser.)

Chemical Tissue Tests

The tests for nitrates, phosphates, and potash are made on filter paper into which the juice from the clippings is pressed. Filter papers that have been specially treated are available so that when used for nitrate and phosphate tests, low and high check readings on the lower part of the paper can be compared to the results above on the juice-saturated areas of the paper. If the tests of the juice show low or none, the need for fertilizer treatments is indicated. If the test for either nutrient is high, the supply of that nutrient is adequate for the time being.

Prepare the filter papers by placing clippings from the green to be tested onto the papers as shown in Figure 1.

* Test kits at $10.00 each can be obtained from the Agronomy Department, Purdue Agricultural Experiment Station, Lafayette, Indiana. Would suggest ordering an extra package of special filter papers and six extra dropping bottles.

Roll paper tightly around the clippings up to double line and with pincers squeeze the juice into the rolled

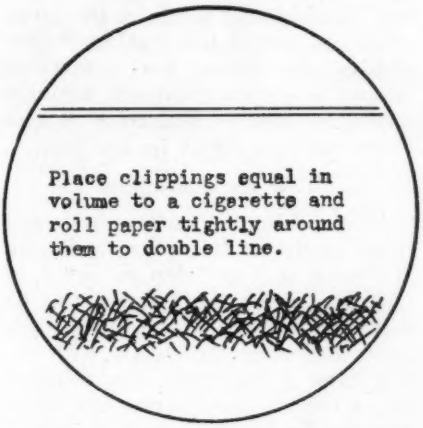
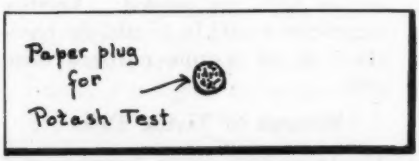


Fig. 1. Use the specially prepared filter paper for first series of tests. (Later on regular filter paper may be used after operator is acquainted with the test readings.) After rolling clippings, squeeze juice from them into paper with a pair of pincers.

paper. Unroll and discard the crushed grass tissues. The tests for nitrates, phosphates, and potassium may be made at once on the paper, or the filter paper may be dried and the tests made later on. (In this latter case it is necessary to label the filter papers correctly, so that the interpretation of the nutrient status of the grass on each green tested can be made.)

Test for Potash

The test for potash is made first because it is necessary to use samples of the paper for this test. With a suitable paper punch take samples from the wetted areas of the filter paper and use them for the potassium tests as follows:



Place the paper plug on a glass slide or, preferably, a watch glass.

a. Add 1 drop Potash Test Solution No. 4 to plug. Allow plug to become thoroughly soaked.
b. Then add 2 drops Potash Test Solution No. 5. Hold slide or glass dish over a dark surface and note any yellow cloudiness or turbidity in the mixture.

Interpretation of Potash Test:

a. If the solution remains clear, potash is needed by the grass.
b. If the solution becomes cloudy, the supply is adequate for time being. A faint cloudiness means an approaching deficiency of potassium in the grass.

Treatment:

If potassium is needed apply at the rate of 2 pounds of 60 per cent Murirate of Potash per 1,000 sq. ft. for the initial treatment. (At the Elks Club 4 to 6 pounds dissolved in 125 gallons water is used for 12,000 sq. ft. green surface to maintain the potash supply in the grass. Usually the first fertilizing treatment consists of ammonia sulphate alone.)

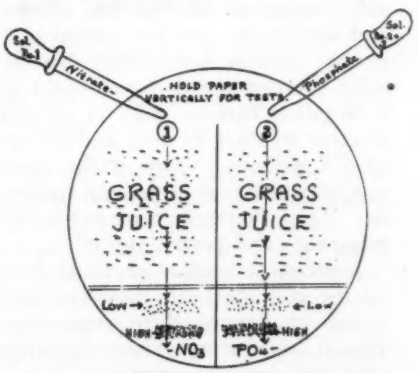


Fig. 2. Shows specially treated filter paper to demonstrate high and low nitrate and phosphate tests. Test solutions are applied at (1) and (2) and let run down across juice-saturated paper and chemically treated zones. The results above may be compared with the treated areas.

Test for Nitrate

After sampling the paper for the potash test, hold paper vertically and drop Nitrate Test Solution, No. 1, on area (1), and let it run down sheet through the parts marked Low and High. See Figure 2.

Note whether any blue color develops immediately on the paper wet with the grass juice, and if so, compare it with the Low and High check-test strips below. (Caution: The nitrate test solution is concentrated sulphuric acid and is very destructive to clothing and shoes, etc.)

Interpretation:

If the test shows a high test for the juice-saturated paper the nitrogen supply in the grass is adequate—and no nitrogen fertilizers need be applied while these high tests are obtained. Possibly the phosphate and/or potash supplies may be low and should be corrected first.

Treatments:

If nitrogen is needed, as shown by low or negative tests, use 20 pounds of ammonium sulphate dissolved in 125 gallons of water, an amount sufficient for three greens, approximately 12,000 sq. ft.

Suggestions:

If ammonium sulphate is not available, substitute ammonium nitrate and use 10 lbs. per 125 gallons. If neither of these is available, dissolve what you can of 100 lbs. of 10-6-4 in a 50-gallon barrel. Add 25 gallons of clear solution to tank and fill up to 125 gallons. Spray at the same rate, 40 gallons per green, and washed in. This treatment may suffice for phosphate and potash as well.

Subsequent routine chemical tests on the clippings will show the adequacy of any of these treatments. Repeat treatments when clippings give tests for low nitrate.

Supplementary Test for Nitrates

Another convenient test for nitrates, which eliminates the use of the sulphuric acid-diphenylamine mixture, is made by using the Nitrate Test Powder prepared by Dr. R. L. Bray of the University of Illinois and sold by the Urbana Laboratories, Urbana, Illinois.

Test Technique

Place a few clippings on center of a 3-inch filter paper and cover with a small quantity of test powder. Fold paper three times over the clippings, squeeze paper and clippings with pincers. Unfold, and watch for the development of a pink-to-red color. Slight pinkish color denotes low quantity of nitrates in grass. (Nitrogen fertilizer should be used.) Red color denotes ample nitrogen supply for the grass.

Test for Phosphate

After making the test for nitrate and recording the result, apply several drops of Phosphate Test Solution, No. 2, at (2), Fig. 2—let the solution run on down through the double lines across the treated strips, then follow with several drops of Phosphate Test Solution, No. 3, over the same path. The development of a blue color indicates ample phosphates in the grass juice. If the juice test coincides with the High check test below the double lines, the grass is well supplied with phosphates. If not, a phosphate carrier, such as ammophos, 20% or 45% superphosphates should be included in the next fertilizer treatment of the green.

Suggestions:

Place content of an 80-pound sack of either 20% or 45% superphosphate in a 50-gallon barrel and dissolve what you can in water. This solution then contains either 16 lbs. or 36 lbs. of phosphoric acid, dependent on kind of superphosphate used. Add amounts to spray tank, so as to supply four pounds phosphoric acid per 1,000 square feet green surface. Usually two of these treatments per season is sufficient. The phosphate should be included with the nitrogen and/or potash applications if either one or both are needed. Another suggestion would be to add the phosphate to an organic nitrogen compost.

Resume of Tissue Tests

The tissue tests above described will indicate whether or not, nitrogen, phosphate, and/or potash are needed by

(*Turn to page* 41)

Excellent 25-acre permanent pasture developed after clearing and draining idle bottom land in Anderson County, S. C., Upper Savannah Soil Conservation District.

Idle Acres in the Southeast Can Be Put to Work

By T. S. Buie

Regional Conservator, Southeastern Region, Soil Conservation Service,
Spartanburg, South Carolina

ANY program for increased production of livestock in the Southeast eventually runs into the argument that farmers ordinarily can make more money from crops like cotton and tobacco than they can from livestock produced with feed crops grown on the same land. This is especially true in times when there is a good market for these "cash" crops. This situation serves to emphasize the importance of using for feed production any other land that may be available.

Since farmers are not in business for their health, it is logical to assume that they are going to continue growing cotton and tobacco as their labor supply and other resources will permit and the market will justify. Yet, in spite of this traditional adherence to "money" crops, the trend in Southeastern agriculture during the past decade to other sources of farm income is quite evident. For one thing, on many cotton farms more livestock may be observed, and milk truck routes now traverse many of the cotton-producing sections. This does not necessarily mean that cotton is in immediate danger of being replaced entirely by livestock. Rather it means that farmers have found it profitable to raise in addition to cotton a few more livestock than they ordinarily raise for family use. Moreover, these farmers have demonstrated that the bulk of the feed and forage required for the livestock can be produced on their farms.

As may be expected, suggestions for increased production of livestock on Southeastern farms that are essentially cotton or tobacco farms invariably

evoke the question, "Where are you going to get the extra land that's needed to make the feed for more livestock?"

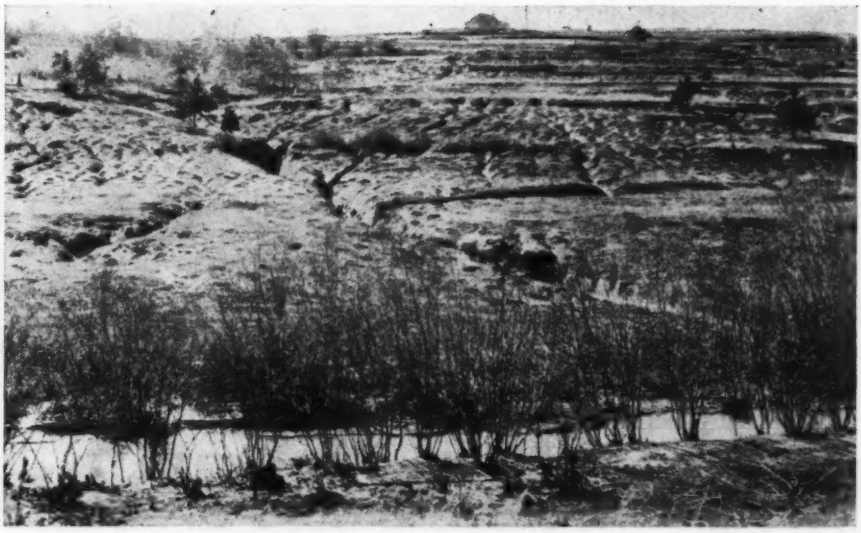
The answer to that question may be found on the many farms which are now producing both cash crops, such as cotton or tobacco, and livestock. Here the owners have effected certain land-use adjustments involving changes and improvements in their cropping systems and in putting their land to crops to which it is best adapted. These improvements in cropping practices and land treatment usually increase acre yields of cash crops, thus releasing some land for feed crops. Idle land also is put back into production. Significantly, too, these changes were made by the farmers without great inconvenience or expense.

First, however, let's glance at a typical small, non-mechanized farm, a one-horse unit, in the cotton section of the Southeast, keeping in mind that several of the Southeastern States have an average of only 5 to 8 acres of cropland for each rural inhabitant as compared with 20, 25, or even 30 acres in some of the Midwestern States.

Generally, this typical farm has about 25 acres of cropland, which experience has shown is about the acreage that one man with a mule can conveniently tend. The farm owner or operator in making his plans for the year first considers the acreage of cotton he will plant. Generally, this is about 8 acres, which ordinarily will produce from 4 to 8 bales, depending, of course, on the fertility of the land, the amount and kind of fertilizer used, seasonal conditions, boll-weevil damage, and other factors. Except for small amounts from incidental sources, such as poultry and eggs, practically all expenses of the farm and farm family are met from the cotton produced on these 8 acres.

When the acreage of cotton has been determined, the next thing the farmer considers is feed for his work stock. Since corn is the universal livestock feed in the Southeast, the farmer must figure on making approximately 150 bushels of corn or its equivalent each year in order to feed his mule and have sufficient corn for meal and grits and for hog and chicken feed. This is an absolute requirement and must be produced whether 4 or 15 of the remaining acres are needed.

Not all waste land in the Southeast is severely eroded. Many areas of fertile bottom land can be cleared and developed for permanent pasture, relieving the pressure on the upland areas.



Waste land that could be put to productive use by planting to kudzu or sericea, which would control erosion and provide perennial hay and grazing for livestock.

Since the average yield of corn in the seven principal cotton-growing States of the Southeast is 12.5 bushels per acre, approximately 12 acres will be needed to produce the required amount of corn. This leaves only 5 acres for all other purposes—small grain, hay, soil-improving crops, temporary pasture, garden, potatoes, and the like.

It is obvious that substantial increases in feed for livestock on such farms must come either through larger acre yields of crops or the use of more land. Improved cropping systems which include small grain and legumes with adequate fertilizer treatment increase yields. These practices also result in better care of the land and the additional crops grown reduce the amount of corn required for mule feed. Although increased acre yields and the addition of small grain help, these small operators still need more land before livestock can add very much to their incomes.

Viewing the situation in a realistic manner, it is apparent that under present conditions not very much additional livestock feed can be produced on any part of the 25 acres of cropland unless acre yields are increased sufficiently to allow a portion of the land planted to other crops to be used for feed production.

Aside from the cropland, the open land on the average farm usually includes several acres of abandoned or idle land. These areas often are hillsides that were cleared two or more generations ago and were cultivated in row crops until accelerated erosion removed virtually all the surface soil and cut gullies down the slope. Such areas, unfortunately, are a familiar sight. They are generally covered to a greater or less extent with broomsedge, which Nature applies as a first-aid treatment to severely injured land. Occasionally a scrub pine tree, which has survived despite periodic spring burning to "freshen the grass," raises its green crown above the brown of the broomsedge. But to the welfare of the farmer the land contributes nothing, except a very small amount of poor grazing for his cow in the early spring or the mild recreation of chasing an occasional rabbit which has found in the drab color of the land and the vegetation it supports a camouflage for his own colorless coat.

Until recent years, about the only po-

Cows grazing kudzu on 40 per cent slope in Putnam County, Tenn. This excellent stand developed from a dozen crowns set along a gully 12 years ago.

tential use for such areas was the production of trees. This meant the planting of tree seedlings, protection of the planted area against damage by fire and grazing, and a wait of 10 to 20 years before any return could be realized. The economic pressure under which Southern farmers have operated so long has accustomed them to thinking in terms of immediate returns, rather than planning for the next generation. Consequently, the bulk of such abandoned fields remained as idle land, with gullies growing wider and deeper each year.

In the early days of the Soil Conservation Service, which was established to develop and demonstrate methods of erosion control, these washed-away, gullied hillsides came in for a major share of attention. The problem was attacked from many angles, but it soon became apparent that one of the most effective treatments was the planting of such areas to kudzu, a deep-rooted perennial legume with an amazing ability to grow on these denuded hills. Outstanding progress made with extensive plantings of kudzu in the demonstration project at Dadeville, Alabama, beginning in 1935, soon had its counterpart in other demonstration areas throughout the Southeast.

Farmers soon found that kudzu not only would control erosion on the most severely washed-away land on their farms, but would also produce from this waste land a large amount of high-quality feed which could be cut for hay, grazed in the late summer and fall when droughts commonly occur and permanent pastures are unproductive, or left for winter grazing after frost had killed the vines. Unlike the familiar peavine hay, it did not require replanting year after year and it was easily cured.

Along with kudzu, sericea lespedeza also was planted extensively for erosion control on worn-out land. While it is slightly more exacting in its soil requirements than kudzu—which will grow on nearly any type of well-drained land in the Southeast—sericea, too, will grow on land of very low fertility. Like kudzu, it can be used for grazing or, if cut at the proper time, when the plants average 10 to 12 inches in height, it makes excellent hay.

With the development of farmer-organized, farmer-operated soil conservation districts, the planting of these

Black Angus cattle grazing two-year-old sericea on the farm of Supervisor D. G. Johnson of the East Alabama Soil Conservation District, near Hardaway, Ala.

deep-rooted, perennial forage crops on severely eroded and idle land has been greatly expanded. At present, 226 farmer-operated soil conservation districts, comprising 165 million acres, have been organized in nine Southeastern States. With the assistance of the Soil Conservation Service, complete soil conservation plans have been developed for 90,000 farms, embracing 15,500,000 acres, in the districts.

An analysis made several months ago of 58,000 farm plans showed that on these farms there was a total of 609,000 acres of idle land, or an average of slightly more than 10 acres per farm. State averages ranged from 3.2 acres per farm in Kentucky to 16.4 acres per farm in Georgia.

Not all of this land consisted of eroded, gullied hillsides such as would ordinarily be planted to kudzu or sericea. Some of it was moderately sloping land which had become too badly eroded for profitable cultivation under prevailing farming methods but could, with proper conservation treatment, such as terracing, good rotations, and adequate application of fertilizers, be brought back into profitable production of grain feed and annual hay crops. On many farms the idle area included fertile bottom land which had been abandoned for agricultural use because it was too wet for row-crop production and had grown up in a tangled mass of vines, bushes, and small, worthless species of trees. Yet, with the clearing of the worthless growth and proper drainage, farmers in the soil conservation districts have developed these wet areas into productive cropland or pasture.

District soil conservation plans provide for putting every acre on each farm to the use for which it is best adapted. Land-conversion data developed in connection with the application of the soil conservation plans for the 58,000 farms referred to earlier give some important information as to the potential use of the considerable acreage of waste land found on Southeastern farms.

Of the 609,000 acres of idle land on the 58,000 farms, 175,937 acres are being put into perennial hay crops, principally kudzu and sericea. Another 141,613 acres, mostly bottom land which had grown up in willows, alders, and other worthless growth, are

(*Turn to page* 43)

Yield and Quality of Cotton Can Be Improved By Boron

By Russell Coleman *

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IN recent years boron has taken the spotlight as one of the essential elements for plant growth, and in numerous cases research workers have found that small applications of borax to the soil will increase both the yield and quality of many crops. Only a few boron investigations have been made with cotton. Some have shown that the growth of cotton plants has been increased and that the flowering of cotton has been accelerated by applications of borax. Few results have shown the effect of boron on cotton yields.

The results presented in this paper represent information obtained from Holly Springs, Mississippi, during three years on Grenada silt loam soil. The site on which the boron test was conducted had been planted to different winter legumes and then followed by cotton, with some plots limed and others unlimed. Originally, large amounts of lime had been applied to the limed plots; and since both legumes and cotton had continuously given a negative response to lime, it was believed that the limed soils had been overlimed. Therefore, the original objective was to determine whether the harmful effect of overliming could be corrected by applications of borax. In 1941, 10 pounds of borax per acre were broadcast over one-half of all of the ($\frac{1}{20}$-acre) plots, and the effect of borax upon cotton yields was determined. The original test contained 8 treatments replicated 4 times, making a total of 32 treatments. After the borax was applied to one-half of the plots in 1941 and 1942, there were 32 replications for the boraxed and unboraxed treatments.

The results suggest that a slight increase in cotton yield may have been obtained in 1941 (Table 1), for in every case except one, where borax was applied the cotton yields were appreciably higher than where no borax was applied. In 1942, 10 pounds more borax per acre were applied on the same plots (making a total of 20 pounds per acre), and a tremendous response in the yield of seed cotton was obtained (Table 1).

In order to determine how much borax to apply to the cotton, the plots were further divided in 1943 so that one-fourth of the plots received 10 pounds more borax (making a total of 30 pounds per acre over a 3-year period), one-fourth received no more but only the residue from the 20 pounds applied in 1941 and 1942, one-fourth which had previously received no borax received 20 pounds per acre in 1943, and one-fourth of the plots continued to receive no borax. It should be emphasized that each 1943 treatment was replicated 16 times as far as the boraxed and unboraxed plots were concerned.

In every case the plots receiving borax yielded considerably more cotton than the ones receiving no borax. It is interesting to note, however, that not only the limed plots responded to borax but a marked response was also obtained on the unlimed plots. All of the results are presented in Tables 1 and 2, but in order to facilitate the discussion,

* The author is indebted to Mr. E. B. Ferris and Mr. O. K. Morgan of the Holly Springs Branch Experiment Station for their assistance in conducting the field work.

an average of the borax treated and untreated yields is shown graphically in Figures 1, 2, and 3.

The results in Figure 1 show that in each of the three years (1941, 1942, and 1943) the soils receiving borax produced 45 pounds, 198 pounds, and 132 pounds more seed cotton respectively than the soils receiving no borax. An average of the 3-year results shows that where borax was used 125 pounds more seed cotton were produced than where no borax was applied.

In order to give a more complete picture of the effect of borax upon cotton yields, the percentage increased yields due to borax is shown in Figure 2. The first 10 pounds applied in 1941 increased the cotton yields only 3 per cent; 20 pounds, half applied in 1941 and half in 1942, increased the cotton yields 13 per cent; and 30 pounds, applied over a 3-year period, increased the cotton yields 26 per cent. It remains to be seen how much more increase can be obtained from additional applications of borax, but the consistency with which borax has increased cotton yields is surprising.

Boron Has a Residual Effect Upon Cotton Yields

The 1943 cotton yields (Figure 3) give some indication as to how much borax may be applied to Grenada silt loam and also show the residual effect of borax upon cotton yields. Twenty pounds of borax applied to the soil during 1941 and 1942 had a stimulating effect upon the 1943 cotton yields, producing 113 pounds more seed cotton than the soil receiving no borax. This shows that borax applied in 1941 and 1942 was not lost from the soil before 1943, and suggests that borax, when once applied, may influence the following crop yields. Twenty pounds of borax applied to the soil in 1943 also had a stimulating effect upon cotton yields, producing 115 pounds more seed cotton than the soil receiving no borax. The results show that 20 pounds of borax applied either in 1943 or during the two previous years increased the 1943 cotton yields about 20 per cent. The 30-pound application of borax (10 pounds for three consecutive years) produced slightly more cotton than either of the 20-pound applications.

The results in Figure 2 indicate that broadcasting 10 pounds of borax per acre was not enough to produce maximum cotton yields on Grenada silt loam in 1941. On the other hand, broadcasting 30 pounds of borax over a period of three years evidently was not enough to cause toxicity, for it consistently increased cotton yields. The results sug-

TABLE 1. EFFECT OF BORAX UPON THE YIELD OF COTTON (1941-1942)

Treatment Lime—Legume	Yield in pounds of seed cotton per acre					
	1941			1942		
	10 lbs. borax	No borax	Increase due to borax	20 lbs. borax (10 lbs. 1941–42)	No borax	Increase due to borax
No lime—no legume	1463	1379	84	1559	1399	160
Lime—no legume	1480	1451	29	1613	1512	101
No lime—crimson clover	1599	1555	44	1844	1694	150
Lime—crimson clover	1528	1582	−54	1715	1630	85
No lime—austrian peas	1582	1508	74	1649	1474	175
Lime—austrian peas	1533	1488	45	1664	1462	202
No lime—hairy vetch	1683	1633	50	2049	1664	385
Lime—hairy vetch	1670	1582	88	1890	1566	324
Average yield	1567	1522	45	1748	1550	198

gest that as much as 20 pounds of borax per acre may be broadcast on Grenada silt loam at any one time without being toxic to cotton. It should be pointed out, however, that Grenada silt loam is heavier in texture than the average soil of the State and will probably either require or tolerate larger amounts of borax than most soils of the State.

Borax Increases Size and Number of Bolls

Since borax increased the yield of cotton on Grenada silt loam, the question arose: Does boron increase cotton yields by increasing the size of the boll or by increasing the number of bolls? In order to answer this question, 100 bolls were sampled at random from each plot and weighed in 1943. In every case bolls from the plots receiving borax weighed appreciably more than bolls from the plots receiving no borax. The results presented in Figure 4 show that 20 pounds of borax applied either in 1943 or during 1941 and 1942 increased the size of the boll about 5 per cent, while 30 pounds of borax applied over a 3-year period increased the

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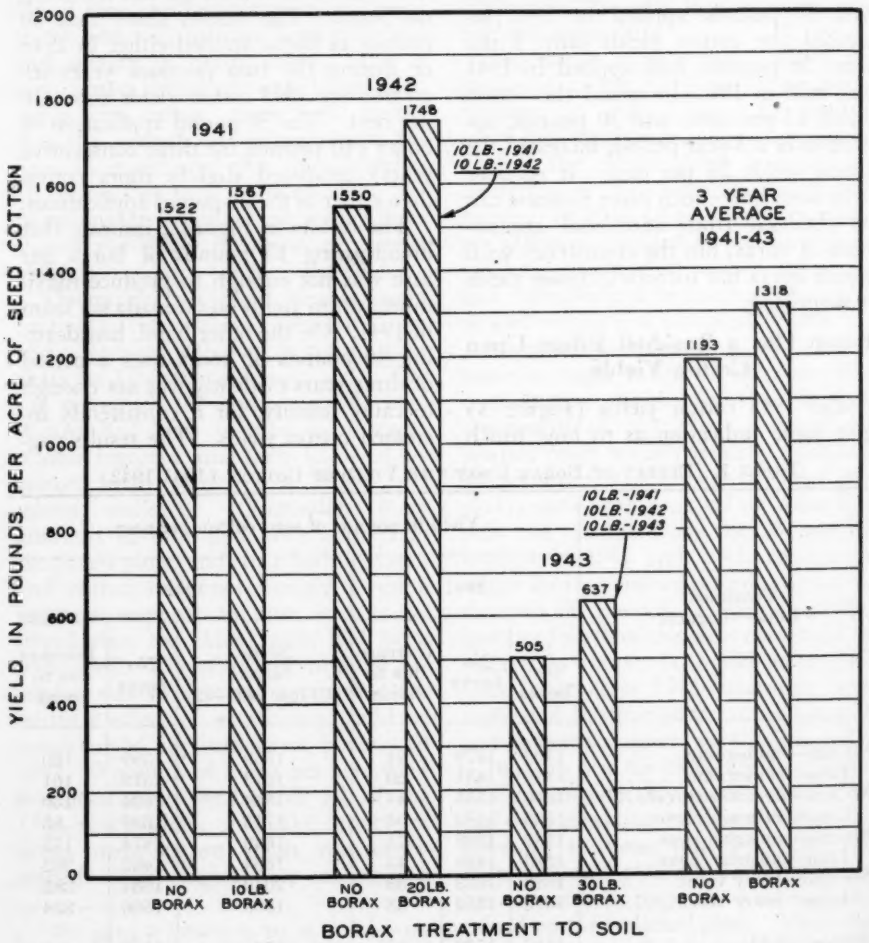

Fig. 1. Effect of Borax upon the yield of seed cotton (1941-1943).

Fig. 1. A long-used, but time-consuming method of haying.

New Ideas in Haymaking From New York Farmers

By Ivan R. Bierly and A. F. Gustafson

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IN a consideration of haymaking it is well to be certain, first of all, that the hay plants have gotten from the soil all the elements that give them real value to livestock. Whatever deficiencies there may be in the soil should be supplied in fertilizers.

Soils rather generally lack a sufficient supply of available phosphorus. This deficiency can readily be made good by applications of superphosphate, rockphosphate in some areas, or complete fertilizers. Sandy and gravelly soils, frequently, heavier soils in certain areas, and muck soils generally are low in available potassium. This element may readily be added to the soil in muriate of potash, to a small extent in hardwood ashes, in mixed fertilizers, and in farm manure. On the average, mixed manure carries about 10 lbs. of potash to the ton, or 6 tons contain the equivalent of 100 lbs. of 60 per cent muriate of potash. Nitrogen may be supplied to the soil in manure, which on the average, carries 10 lbs. of this element to the ton, in leguminous and other residues, and in nitrogenous fertilizer materials or fertilizers. Manure and residues carry important quantities of some of the equally essential minor elements. On moderately to strongly acid soils, applications of lime are essential for the growth of legumes and for the production of other plants that can be made into good hay. Hay plants from rich or well-fertilized soils contain all the ingredients that are essential for healthy growth of animals, and for the production

of highly desired animal products.

Hay of high feeding value and large yield to the acre is made by cutting it somewhat before full bloom, at full bloom, or as soon afterwards as possible. In many sections good haying weather does not arrive until most hay plants have reached or passed the most desired stage. There, a compromise must be made between high quality from the standpoint of maturity of the plants and the arrival of suitable haying weather. Mature legumes and grasses are most easily cured, but they are of relatively low palatability, digestibility, and feeding value, particularly with respect to protein content. The protein content is highest before, but is still satisfactory through the full bloom period.

Haymaking Methods

Haymaking methods have undergone real changes since "Maude Muller raked the meadows sweet with hay," in all probability with a wooden hand rake. Somewhat later came the wooden, one-horse dump rake that was quite generally used in some parts of the country around the turn of the century. Then followed the steel-toothed dump rake, the tedder, the side-delivery rake, and early in this century the hayloader. The latter implement marked the greatest single advance in haymaking methods up to that time. It did, in fact, afford much relief from the heavy work of pitching hay, and served as the leading haymaking implement for nearly four decades.

The advent of tractor power led to further mechanization. The pick-up baler that required three men, and more recently the one-man baler, and the field or barn choppers are late developments. All of these implements are generally used on farms with at least moderately large acreages of hay and require a rather large initial cash outlay. Moreover, both the balers and the choppers perform work that is not essential on the dairy farm when most of the hay is fed. Both of these types of implements have the advantage, however, that they make possible the storing of a much greater tonnage of baled or chopped than of loose hay in the available mow space. In many barns, additional support must be provided to carry the added load. The pick-up baler provides real advantages if hay must be hauled several miles. And with the field chopper, if a worm feed is used, no actual human labor is performed on the hay until feeding time.

Forerunner of the Buckrake

About half a century ago a sweep rake was used, and in places it is used to this day. One horse was used on each side, the hay being swept up from swath or windrow. There was no arrangement for lifting the loaded rake; it was dragged on the ground to the barn or more commonly to the stack out in the field. The junior writer helped stack hay in the field with this implement and two forks, one in the hands of the stacker and the other used to pitch the hay onto the stack. Such stacks were small and each had only 2 or 3 tons of hay. Numerous improvements and adaptations of this early sweep rake have been made, particularly for stacking hay in the open.

The Buckrake

The latest development of this rake is the so-called buckrake, the use of which has spread rapidly during the past few years. The rake is mounted on a light or medium truck or on the chassis of a fairly heavy car. Lighter cars are used, but the heavier ones stand up more satisfactorily. The rake is used to transport the hay from the field to the barn where it is usually put away with a grapple fork or slings. One man operates the hay fork or the slings and another mows it away. For distances under one-half mile in New York, this method of haying requires relatively few man-hours per ton of hay. Tractors, autos, gas engines, electric motors, and motors out of old cars have replaced old Dobbin for

operating the hay fork on many farms. The car motor and the electric motor can be arranged so as to be controlled by the man who operates the hay fork. These methods save the time of the person that formerly rode or drove the horses or team, or more recently that operated the car or tractor.

The Barn Hay Dryer

The barn hay dryer is a recent development, having been introduced into the Northeast in 1944. The cost of around a dollar a ton for power to operate the fan and the considerable outlay for installing motor, fan, and air ducts in the mow are important considerations. The mow is filled uniformly about 8 feet deep over its entire area. Some care and considerable effort are required to spread the hay uniformly over the entire mow floor. To save leaves, this hay is usually put in with about 35 per cent of moisture. Under favorable conditions, the partly cured hay is dried in from 10 days to 2 weeks of operation of the fan. Then an additional 8-foot depth is put into the mow and cured as before. If hay is put into the mow at the right stage of maturity and of curing, and if all goes well, high-quality hay may be made by this method even though weather conditions might not permit the curing of hay outdoors.

Buckrake With Threshing Machine Blower

Alton I. MacDuffie, who lives near Favilion Center, New York, first used an old threshing machine for mowing away combined barley straw in 1940. He brought the straw to the threshing machine with a buckrake, and also used the buckrake during the haying season to haul his hay to the barn, where it was put into the mow in the usual way. Two years later he removed the rear end of his threshing machine, including the fan assembly and blower pipe, and mounted the frame on wheels for ease in moving it around. Thus he avoided the overhead costs for power and lubricants for the rest of the threshing machine. His next step was to use this blower for mowing away his hay.

As the hay is brought to the barn with the buckrake, it is dropped on the ground beside the blower. The hay is fed into the blower by hand with

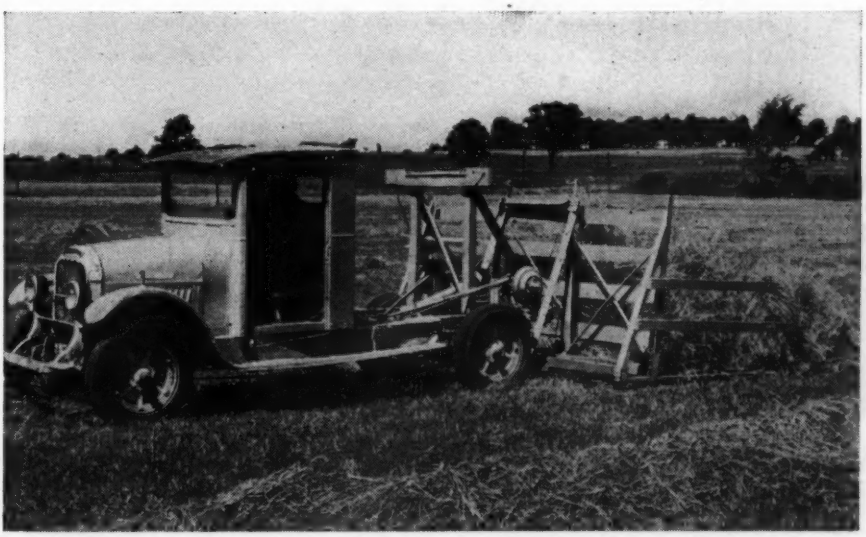

Fig. 2. The buckrake. This rake is mounted on the rear of a truck. Medium to heavy auto chassis also are widely used. The rear end of a car, as shown, serves to lift the rake after it has been loaded with hay. Power is supplied by a power take-off attachment.

pitchforks. Obviously, all the hay is pitched by hand in this way, but, as Mr. MacDuffie said, "At least we stand on solid ground while we pitch it, which is a lot easier than walking on the loose hay in the mow." The buckrake picks up the hay in the field by simply sliding the teeth under the hay as it moves along the windrow. The hay is quite loose when it arrives at the barn. The work of separating it into bunches that will go through the blower is light compared with that when hay is loaded on a wagon, and packed by walking on it. Pitching buckrake hay into the blower is much easier than to tear the hay apart in the mow.

As Mr. MacDuffie pointed out, the hay is broken up somewhat as it passes through the fan, but "since all of it goes into the mow," he rates it just as good as any other hay for feeding. On the basis of three years' experience with the buckrake-blower combination, he concludes that he "can put the hay into the mow slightly greener than with a hay fork." The reason is that the blower pipe distributes the hay evenly and avoids hot spots in the center of the mow where the hay is packed by dropping from the fork. Furthermore, he says, "There is a constant stream of air passing over the hay while the blower is operating."

Mr. MacDuffie's first blower had a pipe 12 inches in diameter, which was a little small. In 1944 he bought a 14-inch blower off another old threshing machine for $15, and added about $45 for parts and for labor to get it home and mounted on wheels so it could readily be moved about.

With a hired man to help him pitch the hay into the blower, and his 13-year-old son to operate the buckrake, Mr. MacDuffie was putting in hay at the rate of almost 2½ tons an hour last summer while we were there to time the operation with stopwatches. The hay was hauled one-third of a mile to the barn. Loads of hay on the buckrake were weighed with Load-O-Meters, which are commonly used to weigh trucks on the highways. This year Mr. MacDuffie will have another buckrake for his 11-year-old son to operate. Then he will have one man and two boys to help him put up hay from 80 acres.

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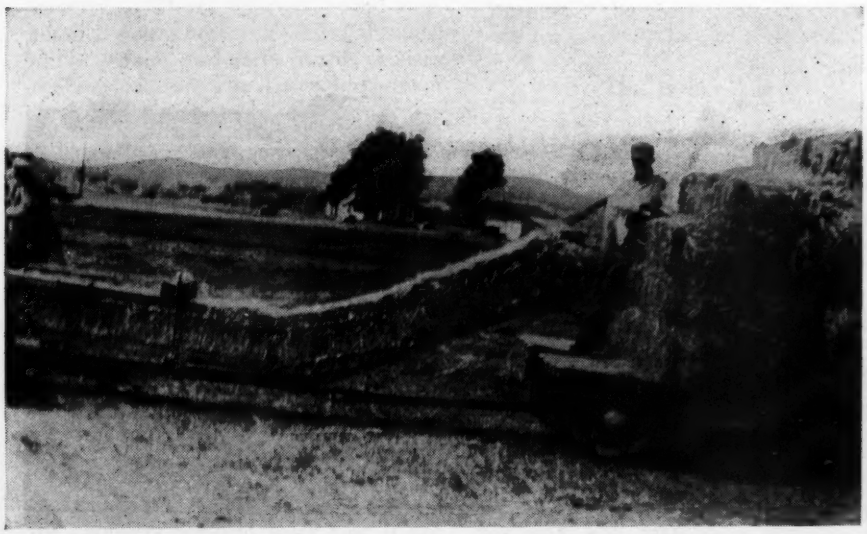


Fig. 3. Baler elevating the hay to the wagon. Instead of dropping the bales on the ground, the bales are being elevated to the wagon by means of a ramp attached to the baler. This saves considerable time in the handling of pick-up baled hay.

Corn on the right shows the response of Corn-Belt land to superphosphate. This growth difference was followed by an increase of 20 bushels per acre grain yield.

The Effectiveness of Phosphate Fertilizer

By H. J. Snider

Assistant Chief, Soil Experiment Fields, University of Illinois, Urbana, Illinois

NEED for phosphatic fertilizers becomes more acute as our agricultural production gradually removes phosphorus from soils. This unavoidable soil depletion has helped to bring some Illinois farm lands to the point where they will not produce a satisfactory crop without the addition of an adequate supply of available phosphorus, and as a rule, for maximum production on these soils, other essential elements also must be provided. There are other soils which will grow reasonably good crops without phosphatic fertilizer, but will produce considerably more when it is added. There are some soils which are still so virgin or perhaps were derived from a parent material so rich in available phosphorus that thus far an application is not needed for maximum production. We are, however, faced with the fact that a very large portion of Illinois soils are deficient in available phosphorus. This condition is steadily growing more serious, and the only means of correcting it is to supply phosphorus to the land in an available form and in relatively large amounts.

The gradual reduction of crop yields is only a part of the seriousness of the situation. It has become evident that livestock, feeding too much and too long on hay and forage from soils deficient in available phosphorus, develop diseases which may cause serious losses. In addition, there is much in the discussion of human nutrition regarding the various health belts in this country. Some folks are inclined to associate

these so-called "health belts" with soil conditions, and they attribute the good health or generally poor health of the population to the abundance or deficiency of certain important elements in the soils from which comes most of their food supply.

Various authorities, both in animal nutrition and agronomic work, have stated rather definite limits for phosphorus deficiencies in hay and forage crops. Most of the authorities place this limit near three pounds of phosphorus per ton of dry material. Above this three-pound limit there is apparently no danger of livestock developing serious diseases due to phosphorus deficiency, but below this value there is considerable probability of injury. Some state that when the phosphorus content of hay and forage is as low as 2.4 or 2.6 lbs. per ton, there usually is serious and consistent livestock injury. This condition prevails when livestock, especially cattle, are fed largely on hay and forage grown on soils deficient in available phosphorus.

Generally speaking, the phosphorus content of hay and pasture crops is in direct proportion to the amounts available in soils. When soils are deficient, the hay and pasture crops on this land are quite sure to be low in phosphorus. Almost without exception, hay and pasture crops when treated with liberal amounts of phosphatic fertilizers will have an increased phosphorus content. In most cases, such treatment will raise the content to a desirable level for livestock feed.

Seasonal conditions, especially rainfall or the lack of it, have considerable influence on the phosphorus content of hay and forage crops and also upon the effectiveness of phosphate treatment applied for these crops. This has been especially noticeable on Korean lespedeza hay in southern Illinois. During dry seasons (late summer and early fall) the phosphorus content of this hay has been found to be extremely low, and liberal applications of phosphate fertilizers have not always increased it up to and above three pounds per ton. This is partly illustrated by data from the Sparta Experiment Field in southern Illinois (Table 1). On this field, the lespedeza hay contained 6 lbs. of phosphorus per ton in a season of sufficient rainfall (1942), while in a dry season, the amount of phosphorus was only three pounds in a ton of hay on phosphated (RLPK) land and was considerably lower on unphosphated (RL) soil. This seasonal condition apparently also affected the content of protein, potassium, and other constituents in the lespedeza hay (Table 1).

This seasonal effect has been noticed in the composition of grasses on phosphorus-deficient soils. Fully headed Kentucky bluegrass on the deficient soil of the Joliet Field, northern Illinois, in the more normal season of 1942 contained 2.2 lbs. of phosphorus per ton of hay. During the extremely wet spring season of 1943, the bluegrass contained 3.8 lbs. of phosphorus per ton. On the Elizabethtown Field, southern Illinois, bluegrass in 1942 contained only 2.0 lbs., and during the wet spring season 1943, it contained 3.6 lbs. of phosphorus per ton of hay. These results from both

(*Turn to page* 45)

TABLE 1.—COMPOSITION OF LESPEDEZA HAY SHOWING EFFECT OF SEASONAL CONDITIONS. DATA FROM SPARTA FIELD SEPTEMBER 3, 1942, AND SEPTEMBER 9, 1943.

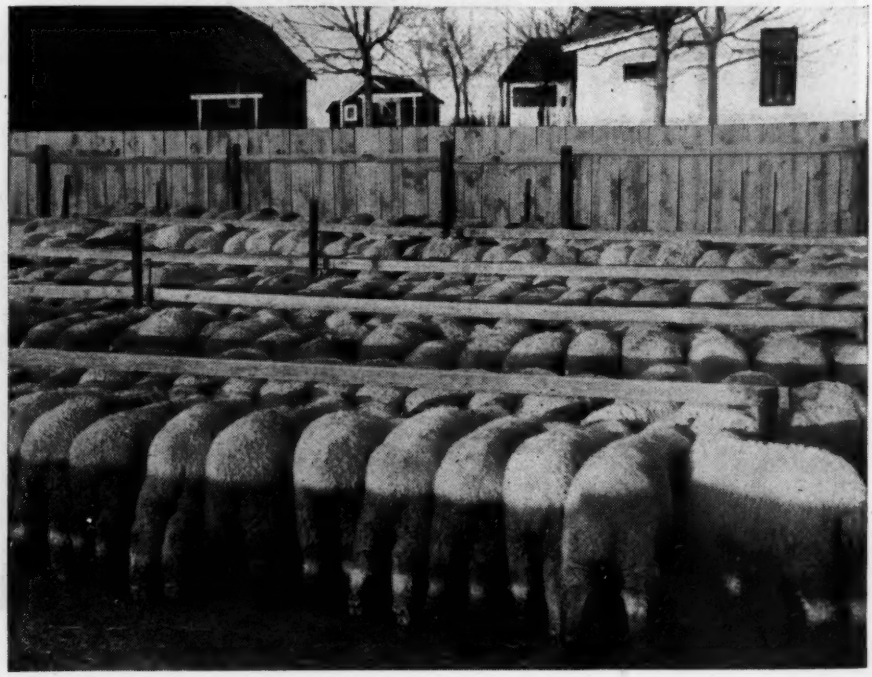
Soil treatment		Pounds per ton of hay						
		Protein	P	K	Ca	Mg	Fe	Mn
RLPK	Sufficient rain 1942....	335	6.0	24.0	24.8	5.4	.74	.44
RLPK	Dry season 1943....	282	3.0	20.2	20.4	6.6	.04	.17
RL	Dry season 1943....	295	2.4	16.2	20.8	7.0	.06	.09

PICTORIAL

"SOMETHING FOR 'TEACHER'"

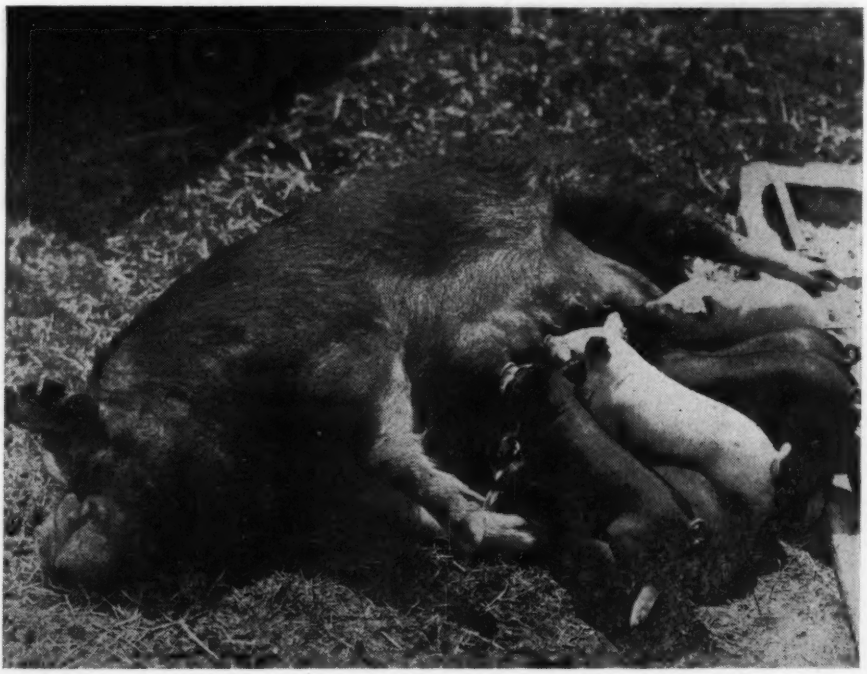
Above: Setting tomato plants on a farm in Clinton County, Indiana.

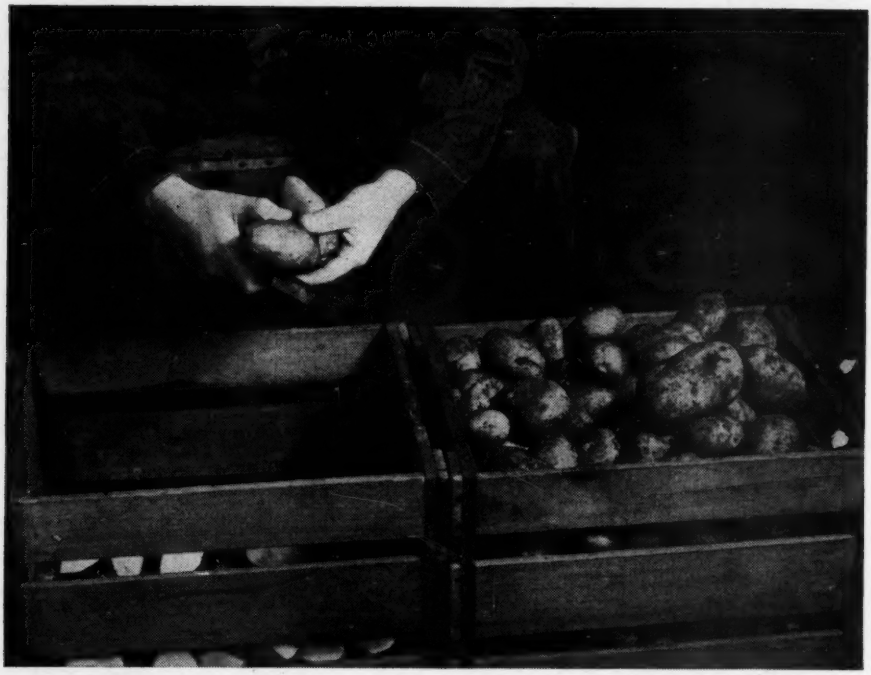
Below: Getting their grain ration (corn) in a Colorado feed lot.



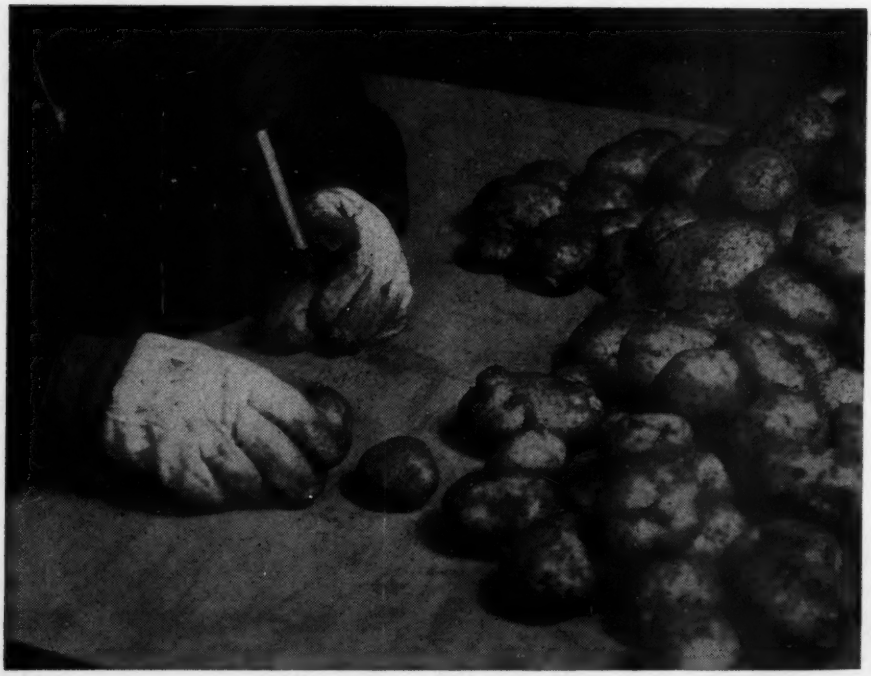
Above: Filling attachment to plow under 1,000 pounds of fertiliser per acre.

Below: Lunching with neighbors seems agreeable to both white pigs and hostess.





The old, slow method of cutting seed potatoes (above) gives way to the new, time and motion saving method—knife blade and table top (below).



The Editors Talk

Conserving Our Soil

The Soil Conservation Service is doing a big job. Judging from reports from around the country, most people feel that it is doing a wonderful job. The interest of the public in this important part of governmental activity for the national welfare is recognized in the report of H. H. Bennett, Chief of the Soil Conservation Service, to the Honorable Marvin Jones, Administrator, War Food Administration. While this interest naturally is greatest in rural sections, it is by no means confined to them. Urban civic organizations and many commercial organizations also are showing an interest in soil conservation work, and churches are bringing its importance to both their rural and urban members.

The work of the Soil Conservation Service is attracting considerable attention in foreign countries as well as at home. Numerous references to the work are found in foreign publications and numerous governmental and institutional representatives and investigators come to this country to observe and study the results at first hand. The report mentions a delegation of twenty-five agricultural technicians representing neighboring American countries who spent a year studying soil conservation methods in this country. Such contacts should help develop international understanding and good-will.

All of this interest is justified. As one travels over the country, he can see numerous evidences that the teachings of the Service are taking hold. Terraces, contour farming, stripcropping, carefully constructed water-ways are increasing, although many areas can be seen where some of these practices should be carried on, but are yet lacking. It is not until one reads the report, however, that it is realized how big a program really is underway and how much has been accomplished, especially since the outbreak of the war when the importance of agricultural production and the necessity of maintaining it during and after the war aroused a greater soil consciousness on the part of everyone.

More than 65,000,000 acres are under the Soil Conservation system of farming, while on another 7,000,000 acres the use of at least some of the Service's recommended practices has begun. Much of this work has been conducted in cooperation with State and local agricultural authorities. Wild Life Conservation also is a part of the program.

The value and importance of the Soil Conservation work is outlined in six points by Dr. Bennett as follows:

1. Soil conservation farming is remarkably efficient farming.
2. Where practiced, it has brought a 20-per cent increase in production per acre, as an average.
3. It has provided a practical guide for greater crop diversification and has resulted in greater diversification.
4. It has meant savings in seed, fertilizer, labor, and power.
5. It has permitted the greatest possible degree of protection—and even

improvement—to soil and water resources under the pressure of intensified wartime production.

6. It offers the farmer and rancher a sound avenue for shifts in type or intensity of production that may become wise in the years ahead to meet possible changes in the price and demand for agricultural commodities.

With all of this fine record of accomplishment, Dr. Bennett realizes that he has only begun his work. Rather than resting on his well-earned laurels, he has drawn up a far-reaching program for the post-war period. A nation-wide inventory of conservation needs was completed during the last year. The work to be done can be divided into two large categories: (1) That which requires heavy equipment and considerable labor over relatively large areas and provides widespread benefits to one or more entire communities; (2) that which can be carried out by the owners and operators of the lands themselves, with technical guidance, and with normal farm equipment, labor, and other production facilities. The report goes on to state:

> "In this latter category are such jobs as contour cultivation; cropping adjustments to put each acre to its own best use, whether that be grass or grain, row crops or trees, stripcropping, crop-rotation improvements, surface mulching with vegetation, liming and fertilizing, the growing of cover and green manure crops, and others. As in the past, qualified technical assistance will be needed by farmers and ranchers in carrying out such work on their land."

The scope and size of this undertaking are indicated by the statement that within six to eight months after the war is over, the Federal Government could put at least 100,000 men to work under the Soil Conservation Service, improving and protecting the Nation's farm plant. A staff of trained technicians would be built up which could efficiently utilize the labor power of at least 500,000 man-years during the first three or four post-war years. It is stated that for at least two or three years of this time, 170,000 men a year could be employed on the heavy, labor-consuming phase of the Conservation program. Dr. Bennett feels that such a large program would be of value to the Nation as a whole and we believe that most will agree with him.

The Eleventh Commandment

Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect thy hills from overgrazing by the herds, that thy descendants may have abundance forever. If any shall fail in this stewardship of the land, thy fruitful fields shall become sterile stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or perish from off the face of the earth.

Dr. W. C. Lowdermilk

Farm Prices of Farm Products*

	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
1910–14 Average	12.4	10.4	69.6	87.6	64.8	88.0	11.94	21.59	....
1920	32.1	17.3	249.5	175.7	144.2	224.1	21.26	51.73	....
1921	12.3	19.5	103.8	118.7	58.7	119.0	12.96	22.18	....
1922	18.9	22.8	96.7	104.8	58.5	103.2	11.68	35.04	....
1923	26.7	19.0	84.1	104.4	80.1	98.9	12.29	43.69	....
1924	27.6	19.0	87.0	137.0	91.2	110.5	13.28	38.34	....
1925	22.1	16.8	113.9	171.6	99.9	151.0	12.54	35.07	....
1926	15.1	17.9	185.7	156.3	69.9	135.1	13.06	27.20	....
1927	15.9	20.7	132.3	114.0	78.8	120.5	12.00	28.56	....
1928	18.6	20.0	82.9	112.3	89.1	113.4	10.63	37.70	....
1929	17.7	18.6	93.7	118.4	87.6	102.7	11.56	34.98	....
1930	12.4	12.9	124.4	115.8	78.0	80.9	11.31	26.25	....
1931	7.6	8.2	72.7	92.9	49.8	48.8	9.76	17.04	....
1932	5.8	10.5	43.3	57.2	28.1	38.8	7.53	9.74	....
1933	8.1	12.9	66.0	59.4	36.5	58.1	6.81	12.32	....
1934	12.0	17.1	68.0	79.1	61.3	79.8	10.67	26.12	....
1935	11.6	16.1	49.4	73.9	77.4	86.4	10.57	35.56	....
1936	11.7	17.2	99.6	85.3	76.7	96.0	8.93	31.78	....
1937	11.1	19.9	88.3	91.8	94.8	107.1	10.36	30.24	....
1938	8.3	17.2	55.5	76.9	49.0	66.1	7.55	21.13	....
1939	8.7	13.6	68.1	75.4	47.6	63.6	6.95	22.17	....
1940	9.6	15.1	70.7	85.2	59.0	73.9	7.62	24.31	....
1941	13.3	19.1	64.6	94.4	64.3	84.0	8.10	35.04	....
1942	18.51	28.3	110.0	108.3	79.5	101.8	10.05	44.42	....
1943	19.84	32.5	149.2	196.7	102.7	127.3	12.82	48.26	....
1944	20.39	38.0	141.0	213.5	113.3	142.8	15.43	52.80	....
March	19.97	21.9	137.0	220.0	114.0	146.0	16.00	52.70	....
April	20.24	23.8	137.0	229.0	115.0	147.0	16.20	52.50	....
May	19.80	37.2	134.0	236.0	115.0	147.0	16.10	52.50	....
June	20.16	49.2	125.0	233.0	115.0	143.0	15.00	52.80	....
July	20.32	45.0	138.0	230.0	117.0	139.0	13.90	53.00	....
August	20.15	39.3	159.0	258.0	117.0	135.0	14.30	53.20	....
September	21.02	42.9	147.0	219.0	116.0	135.0	14.70	52.30	....
October	21.25	41.2	142.0	185.0	113.0	142.0	15.20	52.70	....
November	20.78	45.1	143.0	164.0	106.0	143.0	15.60	53.40	....
December	20.85	43.5	150.0	175.0	106.0	145.0	16.50	53.10	....
1945									
January	20.20	41.9	158.0	190.0	107.0	146.0	17.10	52.80	....
February	19.99	31.8	165.0	201.0	106.0	147.0	17.70	52.70	....
March	20.24	21.4	171.0	207.0	107.0	148.0	18.10	52.00	....

Index Numbers (1910-14 = 100)

1920	259	166	358	201	223	255	178	240	....
1921	99	187	149	136	91	135	109	103	....
1922	152	219	139	120	90	117	98	162	....
1923	215	183	121	119	124	112	103	202	....
1924	223	183	125	156	141	126	111	177	159
1925	178	161	164	196	154	172	105	162	153
1926	122	172	267	178	108	154	109	126	143
1927	128	199	190	130	122	137	101	132	121
1928	150	192	119	128	138	129	89	174	159
1929	143	179	135	135	135	117	97	162	149
1930	100	124	179	132	120	92	95	122	140
1931	61	79	104	106	77	55	82	79	117
1932	47	101	62	65	43	44	63	45	102
1933	65	124	95	68	56	66	57	57	105
1934	97	164	98	90	95	91	89	121	004
1935	94	155	71	84	119	98	89	165	126
1936	94	165	143	97	118	109	75	147	113
1937	90	191	127	105	146	122	87	140	122
1938	67	165	80	88	76	75	63	98	101
1939	70	131	98	86	73	72	58	103	109
1940	78	145	102	97	91	84	64	126	121
1941	107	184	93	108	99	95	68	162	145
1942	149	272	158	124	123	116	84	206	199
1943	160	313	214	225	158	145	107	224	245
1944	165	365	203	244	175	162	129	245	217
March	161	211	197	251	176	166	134	244	191
April	163	229	197	261	177	167	136	243	184
May	160	358	193	269	177	167	135	243	217
June	163	473	180	266	177	163	126	245	245
July	164	433	198	263	181	158	116	245	236
August	163	378	228	295	181	153	120	246	253
September	170	413	211	250	179	153	123	242	239
October	171	396	204	211	174	161	127	244	192
November	168	434	205	187	164	163	131	247	188
December	168	418	216	200	164	165	138	246	228
1945									
January	163	403	227	217	165	166	143	245	262
February	161	306	237	229	164	167	148	244	223
March	163	206	246	236	165	168	152	241	203

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.70	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.09	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
1943	1.75	1.42	6.30	5.77	3.34	4.86	6.62
1944	1.75	1.42	7.68	5.77	3.34	4.86	6.71
March	0.75	1.42	7.40	5.77	3.34	4.86	6.71
April	1.75	1.42	7.50	5.77	3.34	4.86	6.71
May	1.75	1.42	7.81	5.77	3.34	4.86	6.71
June	1.75	1.42	7.81	5.77	3.34	4.86	6.71
July	1.75	1.42	7.81	5.77	3.34	4.86	6.71
August	1.75	1.42	7.81	5.77	3.34	4.86	6.71
September	1.75	1.42	7.81	5.77	3.34	4.86	6.71
October	1.75	1.42	7.81	5.77	3.34	4.86	6.71
November	1.75	1.42	7.81	5.77	3.34	4.86	6.71
December	1.75	1.42	7.81	5.77	3.34	4.86	6.71
1945							
January	1.75	1.42	7.81	5.77	3.34	4.86	6.71
February	1.75	1.42	7.81	5.77	3.34	4.86	6.71
March	1.75	1.42	7.81	5.77	3.34	4.86	6.71
Index Numbers (1910-14 = 100)							
1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	146	129	139
1927	112	79	145	166	143	128	162
1928	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	12	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	131
1937	61	46	140	132	120	120	122
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
1943	65	50	180	163	110	144	189
1944	65	50	219	163	110	144	191
March	65	50	211	163	110	144	191
April	65	50	214	163	110	144	191
May	65	50	223	163	110	144	191
June	65	50	223	163	110	144	191
July	65	50	223	163	110	144	191
August	65	50	223	163	110	144	191
September	65	50	223	163	110	144	191
October	65	50	223	163	110	144	191
November	65	50	223	163	110	144	191
December	65	50	223	163	110	144	191
1945							
January	65	50	223	163	110	144	191
February	65	50	223	163	110	144	191
March	65	50	223	163	110	144	191

Wholesale Prices of Phosphates and Potash**

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Kainit 20% bulk, per unit, c.i.f. Atlantic and Gulf ports
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.525	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	15.17	.572	.623
1939	.478	.190	5.50	.521	.751	24.52	.570	.670
1940	.516	.190	5.50	.517	.730	24.75	.573	....
1941	.547	1.94	5.64	.522	.780	25.55	.570	....
1942	.600	2.13	6.29	.522	.810	25.74	.205	....
1943	.631	2.00	5.93	.522	.786	25.35	.195	....
1944	.645	2.10	6.10	.522	.777	25.35	.195	....
March	.640	2.00	6.10	.535	.797	26.00	.200	....
April	.640	2.00	6.10	.535	.797	26.00	.200	....
May	.640	2.00	6.10	.535	.797	26.00	.200	....
June	.640	2.00	6.10	.471	.701	22.88	.176	....
July	.646	2.16	6.10	.503	.749	24.44	.188	....
August	.650	2.20	6.10	.503	.749	24.44	.188	....
September	.650	2.20	6.10	.503	.749	24.44	.188	....
October	.650	2.20	6.10	.535	.797	26.00	.200	....
November	.650	2.20	6.10	.535	.797	26.00	.200	....
December	.650	2.20	6.10	.535	.797	26.00	.200	....
1945								
January	.650	2.20	6.10	.535	.797	26.00	.200	....
February	.650	2.20	6.13	.535	.797	26.00	.200	....
March	.650	2.20	6.20	.535	.797	26.00	.200	....
Index Numbers (1910-14 = 100)								
1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	110	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	102	87	....
1941	102	54	110	73	82	106	87	....
1942	112	59	129	73	85	106	84	....
1943	117	55	121	73	82	105	83	....
1944	120	58	125	73	82	105	83	....
March	119	55	125	75	84	108	83	....
April	119	55	125	75	84	108	83	....
May	119	55	125	75	84	108	83	....
June	119	55	125	66	74	95	80	....
July	121	60	125	70	79	101	82	....
August	121	61	125	70	79	101	82	....
September	121	61	125	70	79	101	82	....
October	121	61	125	75	84	108	83	....
November	121	61	125	75	84	108	83	....
December	121	61	125	75	84	108	83	....
1945								
January	121	61	125	75	84	108	83	....
February	121	61	126	75	84	108	83	....
March	121	61	127	75	84	108	83	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	143	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935.....	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	150	94	57	160	117	77
1944.....	195	176	151	96	57	174	120	76
March.....	196	175	151	96	57	171	119	78
April.....	196	175	152	96	57	172	119	78
May.....	194	175	152	97	57	175	119	78
June.....	193	176	151	95	57	175	119	69
July.....	192	176	152	96	57	175	121	74
August....	193	176	151	96	57	175	121	74
September.	192	176	151	96	57	175	121	74
October...	194	176	152	97	57	175	121	78
November.	196	177	152	97	57	175	121	78
December..	200	178	152	97	57	175	121	78
1945								
January...	201	179	153	97	57	175	121	78
February..	199	179	153	97	57	175	121	78
March....	198	180	153	97	57	175	121	78

* U. S. D. A. figures.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

**** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Commercial Fertilizer Sales As Reported to Date for the Quarter Ended September 30, 1944," Bu. of Chemistry, Dept. of Agr., Sacramento, Calif., FM-103, Dec. 21, 1944.

"Commercial Fertilizer Sales As Reported to Date for the Quarter Ended December 31, 1944," Bu. of Chemistry, Dept. of Agr., Sacramento, Calif., FM-104, Feb. 15, 1945.

"Wartime Fertilizer Recommendations for Delaware," Agr. Ext. Serv., Univ. of Del., Newark, Del., W. E. Fold. 3, Rev. Feb. 1945, C. E. Phillips and E. P. Brasher.

"Effect of Fertilizer and Environment on the Iron Content of Turnip Greens," Ga. Agr. Exp. Sta., Experiment, Ga., S.C.Ser., Bul. 2, April 1944.

"Maryland Fertilizer Facts for 1944," Insp. & Regulatory Serv., College Park, Md.

"Fertilizers for Potatoes in the Red River Valley," Agr. Exp. Sta., Univ. of Minn., St. Paul, Minn., Bul. 385, March 1945, C. O. Rost, H. W. Kramer, and T. M. McCall.

"Commercial Fertilizers for Minnesota 1944-45," Agr. Ext. Serv., Univ. of Minn., St. Paul, Minn., E.Pamph. 118, Rev. Feb. 1945, C. O. Rost and Paul M. Burson.

"Plowing Under Fertilizer for Crops in Minnesota," Div. of Soils, Univ. of Minn., Univ. Farm, St. Paul, Minn., Soil Ser. 11, Feb. 1945, A. C. Caldwell.

"Fertilizer Trials on Corn in Mower County, 1944," Minn. Agr. Exp. Sta., Hormel Inst., Univ. of Minn., St. Paul, Minn., Soil Ser. 12, March 1945, A. C. Caldwell.

"Inspection of Commercial Fertilizers," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Bul. 353, Sept. 1944, T. O. Smith and H. A. Davis.

"Analyses of Commercial Fertilizers, Manures and Agricultural Lime, 1943," Agr. Exp. Sta., Rutgers Univ., New Brunswick, N. J., Insp. Ser. 13, Feb. 1944, C. S. Cathcart.

"Fertilizer Sales in New Jersey in 1944," Soils Dept., Univ. of N. J., New Brunswick, N. J., March 1945, F. E. Bear.

"Fertilizer Recommendations for North Carolina 1944-45," Agr. Exp. Sta., State College Sta., Raleigh, N. C., Agron, Inf. Cir. 138, Dec. 1944.

"A Chart for Evaluating Agricultural Limestone," Agr. Exp. Sta., Wooster, Ohio, Agron. Mimeo. 98, March 5, 1945, C. J. Schollenberger and R. M. Salter.

"1945 Wartime Fertilizers," Agr. Exp. Sta., Ohio State Univ., Columbus, Ohio, E. Bul. 231, Rev. Feb. 1945, Earl Jones and R. E. Yoder.

"Tonnage Report July 1, 1944 Through December 31, 1944," Dept. of Fert. Insp. & Analysis, Clemson Agr. College, Clemson, S. C., Feb. 21, 1945, H. J. Webb.

"Double Superphosphate," U.S.D.A., Washington, D. C., Cir. 718, Dec. 1944, A. L. Mehring.

Soils

"University Soil Testing Service," Soil Test. Laboratory, College of Agr., Univ. of Ga., Athens, Ga., Nov. 1944, W. O. Collins and J. E. Giddens.

"Improved Practices Reduce Loss of Available Nutrients by Run-Off," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Agron. Mimeo. 61, Dec. 1944, G. D. Bedell, H. Kohnke, and R. B. Hickok.

"Experiments in the Control of Soil Erosion in Southern New York," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 811, March 1944, John Lamb, Jr., J. S. Andrews, and A. F. Gustafson.

"Effect of Land Use and Season on Runoff and Soil Loss," Agr. Exp. Sta., State College Sta., Raleigh, N. C., Bul. 347, Dec. 1944, T. L. Copley, L. A. Forrest, M. T. Augustine, and J. F. Lutz.

"Soil Survey, Macon County Alabama," U.S.D.A., Washington, D. C., Ser. 1937, No. 11, Nov. 1944, C. Lounsbury, R. Wildermuth, G. A. Swenson, M. M. Striker, L. G. Brackeen, H. Sherard, C. L. McIntyre, and V. O. Callaham.

"Physical Land Conditions in Clarke County, Georgia," U.S.D.A., Washington, D. C., P.L.S. No. 35, 1944, Jackson Bennett.

Crops

"Fifty-third Annual Report," Agr. Exp. Sta., Ala. Polytechnic Inst., Auburn, Ala.

"Science Points the Way," Agr. Exp. Sta., Univ. of Ark., Fayetteville, Ark., 56th A.R., Bul. 453, Dec. 1944.

"Soybeans for Oil," Ext. Serv., Univ. of Ark., Fayetteville, Ark., Leaf. 23, Rev. 1944, C. F. Simmons.

"Peanut Production in Arkansas," Ext. Serv.,

Univ. of Ark., Fayetteville, Ark., Leaf. 24, Rev. 1944, C. F. Simmons.

"Vineyard Planting Stock," Agr. Exp. Sta., Univ. of Calif., Berkeley, Calif., Cir. 360, Sept. 1944, H. E. Jacob.

"The Cultivated Persimmon in Florida," Agr. Ext. Serv., Gainesville, Fla., Bul. 124, Jan. 1945, A. F. Camp and Harold Mowry.

"Camellia Culture," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Press Bul. 604, Nov. 1944, R. J. Wilmot.

"Commercial Vegetable Recommendations," Agr. Ext. Serv., Univ. System of Ga., Athens, Ga., Cir. 322, Rev. March 1944, Elmo Ragsdale.

"Cultural Directions for Growing Small Fruits and Muscadine Grapes," Agr. Exp. Sta., Univ. System of Ga., Experiment, Ga., Press Bul. 541, Feb. 17, 1945.

"Recommendation for Preparing and Planting Seed Peanuts," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Mimeo. 39, March 13, 1945.

"Maximum Peanut Yields Dependant on Control of Leaf Spot and Time of Digging," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Mimeo. 40, March 14, 1945.

"1944 Georgia State Department of Agriculture," Biennial Report 1942-1944, State Dept. of Agr., Atlanta, Ga.

"Illinois Hybrid Corn Tests 1944," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Bul. 509, Feb. 1945, G. H. Dungan, J. H. Bigger, A. L. Lang, Benj. Koehler, and Oren Bolin.

"Seeding Meadow and Pasture Crops," Ext. Serv., College of Agr., Univ. of Ky., Lexington, Ky., Cir. 402, Aug. 1944, E. J. Kinney, Ralph Kenney, and E. N. Fergus.

"Nebraska Agriculture 1943," 57th A. R., Agr. Exp. Sta., Univ. of Neb., Lincoln, Neb., May 1944.

"Tomatoes for Good Health," Gen. Ext. Serv., Univ. of N. H. Durham, N. H., Cir. 260, June 1944, J. R. Hepler and Elizabeth E. Ellis.

"The Development and Structure of the Apple Leaf," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Memoir 258, March 1944, L. H. MacDaniels and F. F. Cowart.

"Experimental Methods in Cabbage Breeding and Seed Production," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Memoir 259, March 1944, C. H. Myers and W. I. Fisher.

"The Chemical Composition of Maturing New York State Grapes," N. Y. State Agr. Exp. Sta., Geneva, N. Y., T. Bul. 274, Oct. 1944, Z. I. Kertesz.

"Cutting Irish Potato Seed Pieces," Agr. Exp. Sta., N. C. State College, Raleigh, N. C., Bul. 349, Jan. 1945, L. W. Nielsen and M. E. Gardner.

"Measured Crop Performance 1944," Agr. Exp. Sta., N. C. State College, Raleigh, N C., Bul. 351, Jan. 1945, R. P. Moore and G. K. Middleton.

"Corn Club Manual for 4-H Club Members," Agr. Ext. Serv., N. C. State College, Raleigh, N. C., Club Ser. 3, Feb. 1945, E. R. Collins.

"Irish Potato Manual for 4-H Club Members," Agr. Ext. Serv., N. C. State College, Raleigh, N. C., Club Ser. 21, (Rev.), Nov. 1944, H. R. Niswonger.

"Sweet Potato Production for 4-H Club Members," Agr. Ext. Serv., N. C. State College, Raleigh, N. C., Club Ser. 49, Oct. 1944, J. Y. Lassiter.

"The 4-H Cotton Club Project," Agr. Ext. Serv., N. C. State College, Raleigh, N. C., Club Ser. 54, Feb. 1945, J. A. Shanklin.

"Small Grains," Agr. Ext. Serv., N. C. State College, Raleigh, N. C., E. W. Ser. Bul. 23, Rev. Aug. 1944.

"Grow Better Oats," Ext. Serv., N. Dak. Agr. College, Fargo, N. Dak., Sp. Cir. A-71, Feb. 1944, W. J. Leary.

"Ladino Clover for Western Oregon," Agr. Exp. Sta., Oregon State College, Corvallis, Ore., Cir. 161, March 1944, H. A. Schoth.

"S. C. 10-Point Food and Feed Program," Ext. Serv., Clemson Agr. College, Clemson, S. C., Cir. 266, Feb. 1945.

"Results in 1944 With Hybrid Corn and Corn Varieties in Texas," Agr. Exp. Sta., A. & M. College of Texas, College Station, Texas, P. R. 914, Nov. 24, 1944, J. S. Rogers, R. G. Reeves, and C. H. McDowell.

"Biennial Report 1942-1944," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 315, Dec. 1944.

"Fifty-seventh Annual Report," Agr. Exp. Sta., Univ. of Vt., Burlington, Vt., Bul. 520, Dec. 1944, Harry R. Varney.

"Comparative Performance of Wheat Varieties in Eastern Washington," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bul. 450, Sept. 1944, O. A. Vogel and O. E. Barbee.

"Fifty-fourth Annual Report," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bul. 455, Dec. 1944.

"Pastures for Beef Production in Eastern Washington," Agr. Ext. Serv., State College of Wash., Pullman, Wash., Bul. 315, Nov. 1944, W. Tolman, M. E. Ensminger, E. J. Warwick, and A. G. Law.

"Irrigated Pastures for Central Washington," Agr. Ext. Serv., State College of Wash., Pullman, Wash., Bul. 319, Jan. 1945, A. G. Law, H. P. Singleton, and I. M. Ingham.

"Farm Science Looks Ahead," Agr. Exp. Sta., Morgantown, W. Va., Bul. 317, Dec. 1944.

"Results of Hybrid Corn Yield Trials in W. Va. for 1944," Agr. Exp. Sta., W.Va. Univ., Morgantown, W. Va., Mimeo. Cir. 52, Feb. 15, 1945, J. L. Cartledge, R. J. Friant, R. M. Smith, and D. R. Browning.

"Report of the Chief of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, 1944," U.S. D.A., Washington, D. C., Sept. 1944.

"Report of the Chief of the Bureau of Plant

Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, 1944," U.S.D.A., Plant Industry Sta., Beltsville, Md. Sept. 15, 1944.

"Report of the Director of the Office of Distribution 1944," War Food Adm., U.S.D.A., Washington, D. C.

Economics

"Farm Management Handbook Based on Studies of Pennyroyal Farms," Agr. Exp. Sta., Univ. of Ky., Lexington, Ky., Bul. 463, June 1944, E. J. Mesius, C. R. Sayre, D. L. MacFarlane, and R. E. Graham.

"Land Tenure in Southern Logan County, Kentucky," Agr. Exp. Sta., Univ. of Ky., Lexington, Ky., Bul. 464, June 1944, John H. Bondurant.

"Factors That Affect Costs and Returns in Producing Milk," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 804, March 1944, Ivan R. Bierly.

New Ideas in Haymaking from New York Farmers

(*From page* 24)

Mr. MacDuffie owns two of these blowers and at least five others were operated in Genesee and adjacent New York counties in 1944. We understand that a farmer near Columbus, Ohio, developed a similar machine for mowing away hay almost simultaneously with, but independently of, Mr. MacDuffie.

As an average for the four farms with buckrakes and blowers where time and weight records were obtained last year, two men and a boy were putting in hay at the rate of two tons an hour. This was at about the same rate as for 3-men crews on a larger number of farms where buckrakes were used with grapple forks or slings at the barn. One of the major advantages of the buckrake is that it provides a continuous stream of hay coming to the barn;

Fig. 4. The latest method of mowing away hay. The blower pipe and the fan assembly from a discarded threshing machine are mounted on low wheels for ease in moving about. The hay is pitched into the shallow funnel from which it is sucked into the fan and blown into the mow. Here Hans and Oscar Weinert of South Byron, N. Y., are making hay which is brought in with a buckrake. In 1943, Weinert Brothers made hay with a loader and side-delivery rake in the usual way with a crew of 6 men. In 1944, they stated that they put up hay almost as fast with 2 men, buckrake, and blower. They like the combination.

the blower further provides a means of eliminating much of the hard work at the barn.

Ward Crowfoot, a close neighbor of MacDuffie's, put in his hay alone in 1944. His method was to dump two or three buckrake loads at the blower and then stop to blow the hay into the mow. He fed the blower and operated the rake, too. Even though the haying was done more slowly than with a larger crew, he put his hay into the mow in good condition.

A medium-sized tractor supplies ample power to operate the blower. If an electric motor or gas engine is used, it should have ample power to operate the ensilage cutter, as well, even though the hay blower may not require all of the power.

The low cost of the blower outfit is distinctly in its favor. The buckrake mounted on a truck or auto chassis and the blower from a discarded threshing machine have been acquired by these farmers at moderate cost. The outlay varies considerably with the proportion of the construction work done by the owner. In comparison with choppers, barn driers, and balers, the cost is small. Because of the wartime restrictions on materials and the shortage of labor, it appears probable that most implement manufacturers will be able to supply but few, if any, blowers for the 1945 haying season. Discarded threshing machines, therefore, are probably the most promising immediate source of blowers. After the war, with materials and labor available, the buckrake-blower combination for mowing away hay may readily become deservedly popular.

Ladino Clover Makes A Record

(*From page* 8)

rate of 7 to 8 loads per acre. This is applied after haying. The manure is fortified with 20 lbs. of superphosphate per ton.

In the past manure has been used for corn at the rate of 18 loads per acre. This is usually fortified also. In addition to the manure, cyanamid in the past has been used to increase the nitrogen content of the soil and speed up the decay of the manure and of the sod. He has produced some tremendous yields of silage. One yield measurement, taken a number of years ago, indicated a production of over 30 tons of silage per acre.

The big point is, each field is fertilized every year. There aren't any run-out fields on the MacDanolds farm. With the balanced manure and mineral fertilizer program, the crops are always well fed, and in turn amply feed the cows. Needless to say, this is not a hit or miss program, but one that has been well thought out, since he has a firm belief that lime, superphosphate, and potash are necessary for best results with clover.

In my humble opinion the MacDanolds system gives a big boost to Ladino clover in the Northeast. This is well borne out by his Dairy Herd Records. In 1942 while he was adding to his Ladino acreage, he fed 2,260 lbs. of grain per cow, while in 1943 he fed but 1,220 lbs. Milk yields averaged 12,275 lbs. in 1942 and 13,030 lbs. in 1943. Hay equivalent was 7,320 lbs. in 1942 and only 7,430 lbs. in 1943. The quality of the hay and the excellence of the pasture made the difference in these records and enabled him to produce a little more milk in '43 with a half ton less grain than in 1942. 1943 was the first year the Ladino had any impact on the quality of his hay and the first year the cows had all the Ladino pasture they could eat.

What of these other farmers who have increased their acreage to Ladino? It is our impression that a very considerable number of them could get along with less grain than they now feed if they would but study their cows. As one farmer put it, "Milk is a good price and I don't want to see my cows fall off in production." In other words, because of the present high level of milk prices, he hasn't felt the need of curtailing his grain feeding.

Other farmers of my acquaintance, who have as large a proportion of their tillage down to Ladino as Mr. MacDanolds, practice a sensible fertility program, carry as many cows for their acreage as he does, and sell proportionately as much hay, still feed the old 1:3 grain-milk ratio. Probably they could widen it out considerably if they would, but grain-milk prices are favorable, and, well, "this is no time to experiment."

Later on experimenting will be necessary. Present milk prices will not always prevail. When the slump comes the experience of Roe MacDanolds will be mighty valuable in pointing the way to meet it. Now is a good time to begin putting the farm in order to grow Ladino. Lime, superphosphate, and potash furnish a good starting point. Many farms that are buying hay this winter have a sufficient tillage acreage to carry their herds with due attention to fertility and the full utilization of Ladino clover as pasture and hay.

Where the acreage isn't sufficient to do this full scale, the possible acreage of tillage should be increased on the dairy farm to provide fields that can be seeded as frequently as necessary to Ladino and its companion crops. In some cases this can be provided by buying land. In other cases bulldozing present rocky pastures will be the answer. But in all cases, farmers must realize the necessity of using to the fullest extent this latest addition to our list of forage crops, to weather the storms ahead.

Fertilizing Golf Greens

(*From page* 12)

the grass on the greens tested. Whenever the tissue tests are low or negative for any one of the above nutrients, immediate applications of the nutrient or nutrients should be made so as to prevent the incidence of the starvation conditions which favor some of the fungi attacking malnourished grass. If all of the nutrient tests are high, the application of fertilizer may be delayed until the routine tests show an approaching deficiency of any one of the nutrients. It requires but a few minutes to make the tissue tests to keep a check on the needed nutrients. These tests should be made once a week as a routine practice.

The grass on greens should always be vigorous and kept in the best of health. This insures a favorable situation for insect control treatments and quick recovery from insect damage. It guarantees quick adjustments of the grass when composted.

However, it must be added that the fertilization of greens-grasses does not correct the concurrent troubles resulting from poor drainage, a poor subsoil for the greens, nor the troubles resulting from inadequate air drainage. Some greens, surrounded by water hazards, may be subjected to a too-high water table, and difficulties with the aeration of the roots may develop at times during the season. When all these physical factors are favorable, the fertilization of the greens becomes a routine practice.

Composting Greens

At the Elks Club course a finely screened rich sandy loam, augmented

Fig. 3. Bottom side of turf cutter. Sickle-bar blades are screwed to blocks 1½ inches wide and nailed to framework. The blades cut the turf one inch in depth. The device is weighted down by a man who guides it with handles from a walking plow bolted to it. It is drawn across greens by a tractor with a long rope attached. Light in weight, it is carried back to starting point for each trip across the green. A swath of turf 36 inches wide is air-conditioned each trip. This machine was made by Truman Harvey, Dyer Road, Lafayette, Indiana.

by grass clippings and organic nitrogen manures, is used for composting the greens three or four times each season. It is very important to not apply any considerable quantity of a compost containing clay materials. These compact the turf and affect the aeration of the roots. Water does not penetrate the greens, and other troubles may ensue. Renovation of the greens by cutting the turf, spiking, and other procedures may become necessary.

Soil Aeration for Greens

The grass on any green is no better than its root system. The roots absorb the applied nutrients only when they are well supplied with oxygen, or aerated. Frequently the root mass becomes very thick and compacted under the heavy traffic during the season. Treating the greens with composts containing too much clay in the mixture may affect the aeration of the roots. Grass in low spots or poorly drained parts of the greens may suffer from root suffocation. All of these factors are too well known to require much consideration here.

However, it is possible to detect the conditions favoring root suffocation and injury by testing quickly samples of soil in affected areas on the greens.* If no ferric iron is present in the soil under the affected turf and tests reveal the presence of ferrous iron, renovation of the part of the green affected is imperative.

At the Elk's Club course all greens receive a routine aeration treatment every spring. Operating in past years under a limited budget (The West Lafayette Country Club then) a turf cutting tool was made and operated very successfully. See Fig. 3. It consisted of a triangular platform, 36 inches wide, with sickle-bar blades on blocks bolted to the framework so as to cut the green with parallel slices 1½ inches wide and one inch deep. The device was weighted and guided by one man while another operated the tractor which pulled the aerator attached to it with a long rope across the greens.

The aeration job is done each spring after the grass has started growing well. After the slicing operation each green receives a fine loamy compost, washed in thoroughly. Little or no interference with the putting surface is involved. It is believed that this one processing pays good dividends, along with the fertilization of the greens if and when needed.

Soil Acidity Tests

The soil under the greens at the Elk's Club is neutral to slightly alkaline (pH 7.0-7.2). The water used is obtained from a gravel pit and contains relatively large amounts of dissolved calcium. For this reason we obtain

* G. N. Hoffer. "Fertilized Corn Plants Require Well Ventilated Soils," Better Crops with Plant Food: 29: No. 1, January 1945. The method described in this article for determining poor aeration in soils is used on soils under greens turfs.

excellent results from using ammonium sulphate as a nitrogen source.

Other courses may have acid soils to deal with. It may become necessary to supply nutrient calcium. Calcium nitrate, gypsum, low-grade superphosphate, finely ground rock phosphate, hydrated lime—all may be considered as worthy of trials, when acid soil and nutrition problems are reflected by the soil and tissue tests.

If city water treated with chlorine is used, by all means use high pressure sprinklers on the greens. Much of the chlorine may escape from the water under such applications.

Each Golf Course Has Individual Problems

It is recognized that each golf course has its individual problems. The soils are different. The possibilities for adequate drainage vary. Some greens are in shaded valleys, others on top of hills exposed to varying conditions of climate. The water supplies vary widely in composition. All of these factors influence the management and must be integrated into a successful program for the maintenance of the greens, as well as the fairways. For these reasons it is quite apparent that the methods used on the Elks Club course at Lafayette may not be applicable everywhere.

Greenkeepers are invited to visit the Elks Country Club course, five miles west of Lafayette (Route 52), and inspect the greens. The writer will be interested to hear from any with special problems on fertilizing greens and particularly those who adopt the tissue tests to guide their fertilization program. As stated above, these methods described herein are not recommended officially by the Purdue Agricultural Experiment Station. We are cooperating with the officials in charge of the turf-research program and wish to aid them in establishing an effective service for all interested in turf growing. The chemical tissue tests on grass clippings from fairways, tees, and turfs of all kinds are equally serviceable in formulating fertilizing practices. The fertilizer applications, however, should be made in quantities appropriate for the kinds of turf grown.

Idle Acres in the Southeast Can Be Put to Work

(*From page* 17)

being cleared and developed for permanent pasture. A total of 165,513 acres is being brought back into production by using the land for cultivated crops and protecting it through good rotations, adequate terraces and water-disposal systems, and other conservation measures. The remaining 125,938 acres are being reforested, developed for wildlife, or devoted to other farm uses.

Thus a total of 317,550 acres, or 52 per cent of the formerly idle land on these farms, will be devoted to production of perennial hay crops and pasture. The 165,513 acres being brought back into cultivation through sound conservation practices will further supplement the feed supply with the production of grain and annual hay crops, making a total of 483,000 acres, or nearly 80 per cent of the formerly idle land on these farms, which will directly contribute to increased production of feed crops. Conversion of suitable idle land to crops permits the use of other low-producing cropland for perennials or pasture.

That sound, economical use can be made of farm land in the Southeast was further demonstrated in a farmer-opinion survey made last year on 1,469 farms on which complete conservation plans had been carried out for two years or more in cooperation with local soil conservation districts.

The survey showed that increased feed produced on these farms through proper land use and conservation farming has resulted in material increases of livestock on the farms. The 1,469 farmers reported that they had increased the number of beef and dairy cattle on their farms from 27,560 to 54,005, or 96 per cent; hogs, from 30,860 to 61,576, or 99.5 per cent; and poultry, from 127,714 to 225,491, or 76 per cent.

At the same time, this group of farmers increased per-acre yields of crops by improved land use, good rotations, and other conservation measures. For instance, the amount of land planted to corn on these farms was reduced from 59,157 to 45,165 acres, but total corn production actually increased from 1,132,634 to 1,258,121 bushels. In other words, they produced 125,487 more bushels of corn on 13,992 fewer acres of land.

Going back then to the one-mule farmer, it is apparent that in addition to the 25 acres he regularly plants to crops he has a sizable amount of waste land which, if put to sound productive use, could materially improve his situation by providing feed for increased livestock, giving an adequate diet for his family, and adding to his cash income. Any substantial increase in numbers of farm livestock in the Southeast must result from feed produced on this waste land not now in crops, from conversion of low-producing cropland to better use, and from larger acre yields resulting from improved farming practices.

In the past it has been partly from this type of land that the market-breaking cotton surpluses have come. In the feverish excitement of a rising market, farmers have planted such land to cotton in the hope of increasing their pitifully small incomes. Although per-acre yields from such land might be too low for profitable production even at good prices, this additional production in the aggregate has contributed considerably toward troublesome surpluses.

Only through sound use of this waste land—such as the planting of steep, erodible hillsides to perennial hay and forage crops and the development of improved permanent pastures on adapted bottom-land areas — will this threat be removed. Such use of this land and increased feed production through larger acre yields hold out the only hope that the average farmer has of supplementing his income from cotton, tobacco, and other so-called "cash" crops with additional income from livestock and livestock products.

Results of Survey

The seriousness of the idle-land problem in the Southeast and its apparent throttling effects on agriculture are revealed in a "conservation needs" survey made by the Soil Conservation Service. The production capabilities of 7,942,833 acres reported as idle in the 1940 census report were classified, and 3,727,865 acres, or nearly half of the total acreage, were found suitable for cultivated crops, provided improved rotations and other soil conservation measures are employed.

Another 499,857 acres, or 6 per cent of the nearly 8 million acres of idle land, the survey showed, are suitable for a kudzu-corn rotation, in which kudzu is grown 3 to 4 years for every year of corn.

One-fourth of the idle land, 1,968,739 acres, which is steep and for the most part badly eroded, appears best adapted to kudzu and sericea. Another 650,869 acres, or 8 per cent of the total, are suitable for pasture. Most of this land is bottom land overgrown with willows, alders, and other worthless growth, which can be brushed, drained if too wet, and developed into excellent pasture.

The acreage found suitable for pasture may seem low when compared with the total acreage of land and in view of the acute need for better pastures in the Southeast. It should be noted, however, that 25 per cent of the idle land appears well suited to growing kudzu or sericea, both of which

provide hay or grazing. If we combine the kudzu-sericea and pasture acreages, we have 33 per cent of all the idle land going back into hay or pasture, or a total of 2,619,608 acres. Actually, district conservation plans written to date provide for putting a larger percentage than this into perennial forage and pasture.

Fourteen per cent of the idle land, or 1,095,525 acres, according to the survey, is best suited to trees. The Southeast is a heavy producer of timber, but too many farmers still find themselves short of fuel wood for firing tobacco barns and for home uses, poles for stacking peanuts, and lumber for new buildings and fences. Cash income may be increased through the sale of pulpwood and other timber products.

For the most part, this idle acreage is scattered, and, as previously mentioned, may range from 3 to 16 acres on the average farm. Collectively, it forms a vast reservoir of nearly 8 million acres which at present contributes nothing to southern agriculture, or, from a more realistic point of view, is a distinct liability to the farmer inasmuch as it must share the tax burden and in its present state tends to restrict farming operations.

Yet, this idle land need not remain idle. It can be put to safe, productive use if its capabilities are recognized and the necessary conservation measures are employed as it is brought back into production.

Moreover, idle land on the farm is a luxury that the average farmer in the Southeast can ill afford. He cannot throw it away and substitute good land. However, it can be put to the farming use for which it is best adapted —be it crops, hay, pasture, or trees— and, wisely handled, will produce and serve the farmer well.

It would be a mistake to assume that an extensive livestock industry will be developed solely on the feed produced on land that now is idle. Proper use of idle land can, however, be made to contribute a large portion of the cheap forage for an expanded livestock program. The forage that is being grown on previously idle and low-producing cropland is enabling farmers who have well-developed plans of soil and water conservation on their farms to use profitably a portion of their best cropland for the production of grain required to supplement the forage.

Once idle land in the Southeast is put to its best and safest farming uses, its owners will find themselves in a better position to adjust their farming systems in accordance with the current demands of the Nation's food-consuming and fibre-using public. This means that with a flexible system of farming, such as wise land use makes possible, the owners will naturally be in a better position to cope with periods of agricultural adversity, or lean years, as well as capitalize on periods of agricultural prosperity.

The Effectiveness of Phosphate Fertilizer

(*From page* 26)

fields represent untreated soils. In each of these two years the added phosphates on both fields made additional gains in phosphorus content of the bluegrass hay over the untreated land. The increases due to the treatment were considerably higher in the wet season, indicating that applied phosphates were more effective when there was plentiful rainfall.

These seasonal differences affected also the content of other constituents in the bluegrass hay. On both the Joliet and Elizabethtown fields the protein content was 18 to 26 lbs. per ton higher during the wet season, and the potassium content was up to 18 lbs. more per ton of hay. There was little difference in the calcium and magnesium content of this hay.

The more practical side of phosphorus deficiency in Corn-Belt soils may be realized from a study of some red clover hay data obtained on the Mulvaney Farm (Table 2). Untreated land on this farm produced 5,480 lbs. of hay per acre at the first cutting, and on land where phosphates were applied, the yields were as high as 9,380 lbs. This farm is located in west central Illinois near Brimfield and is in an area which produces large quantities of corn, soybeans, and other grain crops for direct marketing. Evidently this system of farming has taken a heavy toll of the available phosphorus which was originally in these soils.

TABLE 2.—RED CLOVER HAY. PHOSPHORUS ADDED IN POUNDS PER ACRE WITH PER CENT REMOVED IN HAY. ACRE YIELD OF DRY HAY AND PHOSPHORUS CONTENT OF HAY. MULVANEY FARM—JUNE 3, 1938.

Phosphates added	Pounds per acre		Removed Phos. Per cent	Hay lbs./A	Hay phosphorus lbs./ton
	Material	Phos.			
None	0	0	.....	5480	2.8
Fused phosphate	250	34	29.8	9380	3.8
Superphosphate	250	22	21.3	7220	3.4
Rock phosphate	1000	140	10.8	9360	4.4

To a certain extent the availability of the three phosphates used on this farm (Table 2) may be measured by the amounts in the clover hay. Approximately 30 per cent of the fused phosphate was extracted by the first cutting of red clover, approximately 21 per cent of the superphosphate and about 11 per cent of the rock phosphate were available for this red clover crop. These phosphates were applied ahead of the oats-clover seeding the previous April. There was evidently a shortage of phosphorus where only 250 lbs. of superphosphate were applied, as indicated by the lower hay yield (7,220 lbs.) and lower phosphorus content of the hay. These results indicate that phosphate applications on this type of soil should be quite liberal and should be renewed at rather frequent intervals in order to maintain crop yields and supply a relatively high percentage of phosphorus in the crops.

The effectiveness of phosphate treatment on corn is illustrated by some data from the Adolph Stroh Farm (Tables 3 and 4) located in central Illinois. On this farm a relatively small amount of superphosphate placed in bands on each side of the hill in 1941 increased the corn yields during the two years, 1941 and 1942. Chemical analyses of the plants showed a probable recovery of 94 per cent of the applied phosphorus. This indicates relatively little fixation of phosphorus by the soil through this method of application.

A broadcast application of 500 lbs. of superphosphate maintained a relatively high corn yield both the first and second years after application (Table 3). This was applied after the land was plowed in the spring and disked into the surface. The 13.4 lbs. of phosphorus recovered by the corn crop during the first year were much greater than the amount recovered (4.8 lbs.) during the second year. This indicates probable fixation by the soil through this method of application. The percentage recovery by the two corn crops (41.6 per cent) was less than half the amount applied and tends to indicate that this rate of application might be effective for two additional years.

Rock phosphate was less effective than the superphosphate the first year (1941) both in amount of phosphorus recovered in the corn and in acre yield.

TABLE 3.—CORN CROP. PHOSPHORUS ADDED AND RECOVERED IN THE CORN, GRAIN, AND STALKS IN POUNDS PER ACRE, ALSO PER CENT RECOVERED. ACRE YIELD OF GRAIN. STROH FARM—1941-42.

Phosphates applied	Added lbs./A		1941 recovered grain		1942 recovered grain		1941–42 recovered per cent
	Material	Phos.	lbs.	bu/A	lbs.	bu/A	
None	0	0	.....	84	.....	58	.....
Superphosphate hill-dropped	175	15.1	7.2	104	7.0	81	94.0
Superphosphate broadcast	500	43.7	13.4	100	4.8	85	41.6
Rock phosphate broadcast	2000	280.0	3.7	93	5.3	81	3.2

However, during the second year (1942) the amount of phosphorus recovered (5.3 lbs.) and the corn yield (81 bushels) compared favorably with the superphosphate treatment. This indicates a higher availability for this material as it becomes more thoroughly incorporated with the soil. The rock phosphate was applied in November 1940 and plowed under in the spring of 1941 when the land was first prepared for corn.

Phosphorus content of both stalks and grain (Table 4) from the phosphated land in 1941 showed considerable increase over the check and there was an increase in the phosphorus content of the grain in 1942. Here again these increased amounts of phosphorus taken up by the corn crop were not necessarily luxury consumption, but were additions to the amount essential to the proper nutrition of animals feeding on this grain or stover.

The Stroh Farm soil was also deficient in nitrogen as indicated by the lower corn yield in 1942 compared with that of 1941 (Table 3). Corn yields on the untreated land decreased from 84 bushels to 58 bushels per acre and there were not sufficient differences in the two seasons to warrant such a large decrease. The previous rotation on this field was corn, oats, clover-timothy, timothy, timothy. This rotation would not add any considerable amount of legume nitrogen to the soil. The timothy-clover was used for pasture and the cornstalks were left on the land, which represented the total organic matter returned to the soil.

Available potassium content of this soil was approximately 300 lbs. per acre, an amount sufficient for the time being. This apparent surplus would doubtless rapidly disappear if a heavy grain rotation was followed on this land.

TABLE 4.—PHOSPHORUS CONTENT OF CORNSTALKS AND GRAIN. STROH FARM—1941-42.

Phosphates applied	Phosphorus pounds per ton			
	1941		1942	
	Stalks	Grain	Stalks	Grain
None	1.2	3.6	1.2	3.6
Superphosphate hill-dropped 175 lbs.	1.6	4.6	1.2	4.6
Superphosphate broadcast 500 lbs.	2.0	6.2	1.0	4.0
Rock phosphate broadcast 2,000 lbs.	1.8	5.6	1.0	4.0

The different phosphates used in these field tests on Illinois soils indicate the enormous benefits both in increasing the hay and grain yields and in producing hay and grain with a high phosphorus content. It is quite evident from the amounts of phosphorus removed in the various crops that relatively large applications of available phosphorus are required to supply crop needs and prevent further depletion of native soil phosphorus.

Yield and Quality of Cotton Can Be Improved by Boron

(*From page* 20)

size of the boll about 8 per cent. These increases, though small, are consistent, and are probably significant.

Since the cotton yield for 1943 was increased about 20 to 26 per cent by the borax treatments, the small increase in boll size (5 to 8 per cent) does not account for all of the increased cotton yield. Besides increasing the size of the boll, borax must have also increased the number of bolls.

Borax Did Not Affect Characteristics of Cotton Seed Oil

Cotton seed from each of the plots were analyzed for percentage oil, and the characteristics of the cotton seed oil were determined. An average of the percentage oil, and the refractive index, iodine number, and saponification number of the oil are shown in Table 3. The results indicate that borax has had no effect upon the percentage oil in cotton seed nor upon the characteristics of cotton seed oil.

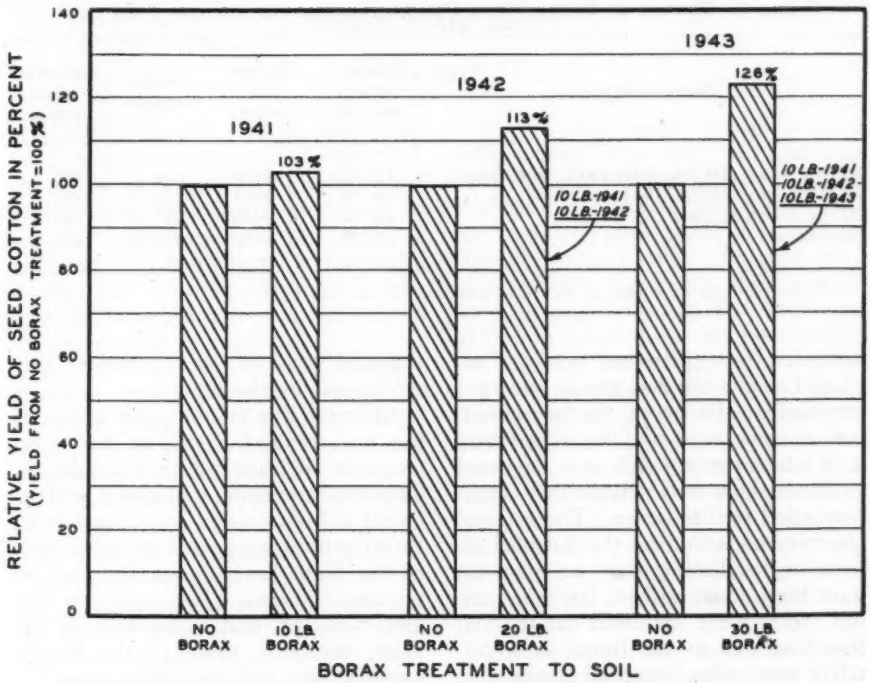
Borax Influenced Cotton Directly

During the three years in which borax was applied to Grenada silt loam, winter legumes were grown on the soil every year, and it was thought that borax may have been increasing the yield of winter legumes which in turn increased the cotton yields. However, in 1943 the winter legumes were harvested and weighed from each plot; the results show that borax did not increase the yields of crimson clover, bur clover, or hairy vetch. The stimulating effect of boron upon cotton was evidently a direct rather than an indirect one.

The present study was undertaken as a preliminary investigation. Unfor-

TABLE 2. EFFECT OF RATE AND TIME OF APPLYING BORAX UPON COTTON YIELDS (1943)

Treatment Lime—legume	Yield in pounds of seed cotton per acre			
	20 lbs. borax (10 lbs. 1941–1942)	30 lbs. borax (10 lbs. 1941–42–43)	20 lbs. borax in 1943	No borax
No lime—no legume	624	614	554	500
Lime—no legume	614	570	592	492
No lime—crimson clover	628	600	590	544
Lime—crimson clover	588	610	600	554
No lime—austrian peas	584	602	608	548
Lime—austrian peas	640	612	578	440
No lime—hairy vetch	640	724	722	522
Lime—hairy vetch	632	762	714	530
Average yield	618	637	620	505



Above: Fig. 2. Effect of borax upon the percentage increase in cotton yields.

Below: Fig. 3. Effect of rate and time of applying borax upon cotton yields.

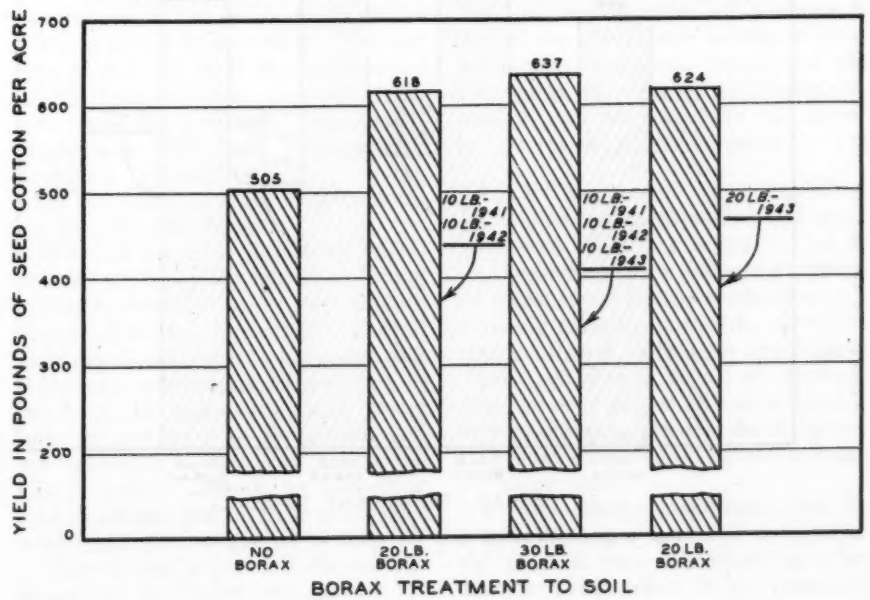


TABLE 3. EFFECT OF BORAX UPON CHARACTERISTICS OF COTTON SEED OIL*

Borax treatment	Percent cotton-seed oil	Refractive index	Iodine number	Saponification number
30 lbs. borax (10 lbs. 1941, 1942, and 1943)	19.07	1.4656	130.2	190.1
20 lbs. borax (10 lbs. 1941, and 1942)	19.12	1.4661	134.0	192.1
20 lbs. borax in 1943	18.86	1.4646	131.4	191.7
No borax	19.36	1.4660	132.4	193.8

* Results represent an average of eight determinations for each treatment.

tunately, the experiment was not arranged so that the data can be analyzed statistically. However, the large number of replications and the consistency with which cotton yields were increased by borax show convincingly that cotton responded well to borax. The original objective of correcting the harmful effects of overliming may or may not have been accomplished, but since cotton yields were increased on the unlimed as well as the limed soils, certainly some other beneficial effects were obtained from the borax besides correcting for overliming.

Although the results show that cotton has responded well to borax on Grenada silt loam soil, they should not leave the impression that cotton will respond to borax on all Mississippi soils. Investigations conducted on other soils of the State have shown little or no response to borax. The results do suggest, however, that many soils of the State, especially those of the Brown Loam region, will respond to borax.

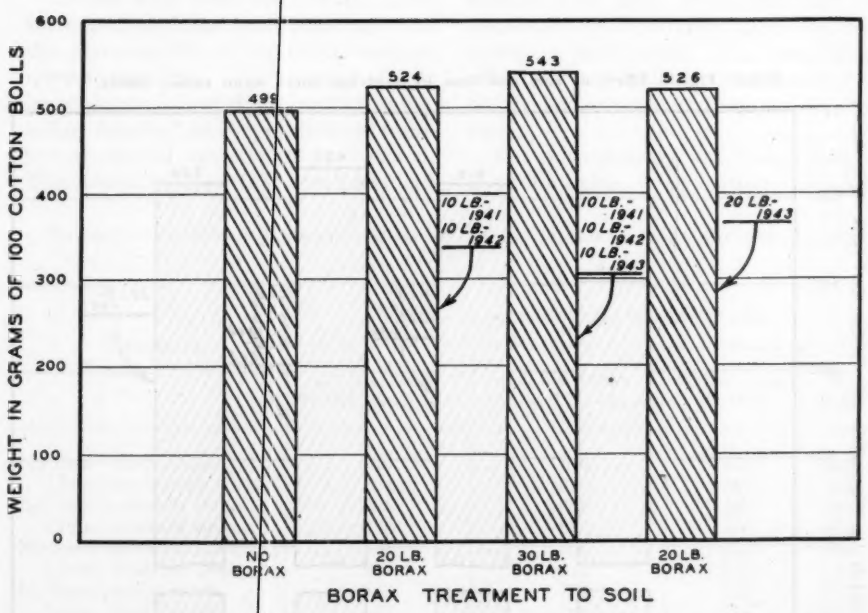


Fig. 4. Effect of borax upon the weight of cotton bolls.

Home State Stuff

(*From page* 5)

and doctors starve. Right now they have too blamed many visitors and transients to bother much with more of this health-fad boasting—owing to big war industries. Just a few years ago they also had plenty of unsought visitors who came in shoals but not to seek the fountain of youth, but merely the crumbs of sustenance.

My own state and some of its chilly neighbors seldom spend good cash money in displays of the health inducement. They tell about pure water and fresh air all right, but too much of either one does not always breed health. So about all we have left to do, and that's plenty, is to egg on the Kiwanians to drain marshy spots and improve the well water supply so as to drive off the mosquitoes while we mix our aqua pura with something a wee bit tastier.

I firmly believe that your ordinary local town nowadays is a lot healthier to spend the night in than it was back in the eighteen nineties. Just take the matter of inhabited beds, for instance. I can take you to seventeen rural town hostelries in a row and you won't get a bite at night on your fishing trip any oftener than you will daytimes on the river. That one local sore spot alone, now removed and renovated, proves conclusively that once the urge for happiness through healthful living takes firm hold of a community nothing can stop the thing.

When it comes to discussing happiness through morality and clean living, it may be summed up in one sentence derived from hearing reports of rural sociological welfare. It is simply that elders of a community succeed best in handling the morals of their young folks by rowing with the stream and not against it. This, and giving the kids a natural chance to boss their own diversions and do their own police work—and you've got it!

That is, you've got it if the oldsters know how to behave themselves.

Taking up local tradition and achievement in its turn, we find that Paul Bunyan, Mike Finn, and Big-Foot Wallace are echoes of the heroics and anecdotes and indomitable will of those who did things locally. The sum total of what they did locally finally made up state pride and this led to warmth of feeling which made us love our land the more we boasted of her.

I often wonder what we would do in America if we did not have a few professional liars, the harmless kind who revel in feats of constructive imagination. Their efforts challenge us to educate more engineers and professors and scientists and even economists and philosophers. So I advance the thesis that without boasters we would lack builders.

One of the popular state boasts, next to health and low income tax rates, has been scenic achievement. It's only in recent years though that folks who got jealous and touchy about their own state scenery and felt state ownership of it began to realize that all these beauties and wonders of nature belonged to everybody in the nation. Previously, many had thought of the mountains as mines, the forests as lumber, and the waterfalls and rapids as sources of profitable power.

SOON the zealots for conservation and recreation stepped in and saved what was left of the scenery. Out of this beginning came the waves of tourist traffic, amplified by tremendous advertising campaigns, and the glories of America began to be fully appreciated. Thereupon a new brand of conservation had to be dusted off and put to use, as regulations to prevent the enthusiastic visitors from despoiling and marring the nicest spots.

I have always maintained that he who seldom gets a chance to glimpse the marvels thus advertised in other states can find solace in the particular

type of topographical and arboreal features which his own locality offers. When one is about to quit the state environment he long knew and loved, he learns to treasure commonplace bits of scenery and colorations in a landscape unmarked by manifest marvels.

It may be just a sweep of prairie fringed in oak groves. Or a dip in the road and a hill trail winding away through haze. Perhaps a reflection of a sunset sky in a small rural pond, drawn over the mists of a marshland, or just moonlight on some hay stacks.

When you couple this up with old memories and long-departed chums—who now brag about Nevada or Maine perhaps—and soak this sentiment in the juice of pioneering and courage amid poverty, spiced with more tall tales by members of the local liars' club, you somehow imbibe the real essence of the state pride stuff.

STATE pride runs a harder gantlet here than it does abroad owing to the fact that we in America all speak much the same language, or at least get the drift of what we say to each other before the conversation ends, even with regional dialects. In foreign lands you usually find the language and the boundaries terminating simultaneously. Thus you have the extra added feature of foreign differences to make you feel less at home and therefore more impressed with what they have to show you beyond the border. Here in America we are finding it harder as time goes by to maintain this original form of state pride, and it will be even more difficult when air travel gets as common as trains and motors are today.

The aerial traveler certainly does not sense the break or limits between states and state lines, and the whole flamboyant panorama unrolls below and blends into one huge pattern of continental magnitude. I suppose this is indeed our destiny and one that we should welcome and not be sorry to see. We will look at larger murals instead of miniatures. It may be good for what ails us.

But even if this happens in the next decade and state pride stuff takes a secondary place in our philosophy, it need not and probably will not stop the growth of state rights and local judgment in government. These privileges were what they fought for years ago when every home was isolated and every community made its own laws.

Signs of the struggle that would ensue are seen today. Your smallest democracy, the district school, resists the logic of consolidation and holds out for local rule, even if it only affects three or four families. Your county is the center of things, too, and talk of merging counties or altering their form of government meets with stubborn and forceful opposition whenever legislatures broach the subject.

So we see in a mechanical and physical way the old state pride era is nearing its end, including barriers and tolls against trade and traffic. On the other hand we cling to the spiritual and sentimental aspect of local preferences and insist that nothing shall erase from our minds those intangible things that endear a state to its native sons.

Well, maybe this is a good combination. Whether it is or not, we face some sort of compromise like this because thousands of our children are wandering in many climes long distances away; and in returning to us they pause in other states and get the flavor of nice dishes and learn the meaning of local idioms and sometimes marry and settle down there.

I GUESS that a state is something like a house. You grow up in it and enjoy life there for many years and finally the time comes to make a change. But the changing and shifting around won't be so hard to take when you realize that you are not worthy of keeping old friends if you can't get the habit of making new ones.

And I've never been in a state yet where the folks didn't have a perfect right to be proud of themselves for what good they had done to make a better America.

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Circulars

Tomatoes (General)
Asparagus (General)
Vine Crops (General)
Sweet Potatoes (General)
Fertilize Potatoes for Quality and Profits (Pacific Coast)
Fertilizing Small Fruits (Pacific Coast)
Better Corn (Midwest) and (Northeast)
Fertilize Pastures for Better Livestock (Pacific Coast)
Of Course I'm Interested (Pastures, Canada)
Meet the Family (Canada)

Reprints

T-8 A Balanced Fertilizer for Bright Tobacco
N-9 Problems of Feeding Cigarleaf Tobacco
T-9 Fertilizing Potatoes in New England
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What Is the Matter with Your Soil?
K-4-41 The Nutrition of Muck Crops
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E-2-42 Fertilizing for More and Better Vegetables
S-6-42 A Comparison of Boron Deficiency Symptoms and Potato Leafhopper Injury on Alfalfa
FF-11-42 Boron in Agriculture
II-12-42 Wartime Contribution of the American Potash Industry
JJ-12-42 The Place of Boron in Growing Truck
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H-2-43 Plant Food for Peach Profits
J-2-43 Maintaining Fertility When Growing Peanuts
M-3-43 Lespedeza Is Not A Poor Land Crop
P-3-43 Ohio Farmers Try Plow-Under Fertilizers
S-4-43 Plow-Sole Fertilizers Benefit Tomatoes
W-4-43 The Soil Is the Basis of Farming Business
X-5-43 Malnutrition Symptoms & Plant Tissue Tests of Vegetable Crops
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
BB-6-43 Sericea Is A Good Crop
FF-8-43 Potash for Citrus Crops in California
PP-12-43 Commercial Fertilizers for Livestock Farms
QQ-12-43 Potash in War Production
A-1-44 What's in That Fertilizer Bag?
B-1-44 Available Potash in the Surface Soils of Georgia
E-2-44 Plow-Sole Fertilizers Increase the Profits
F-2-44 Where Do We Stand With Fertilizers?
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J-3-44 The Response of Various Crops to Potash Fertilization in South Carolina
K-3-44 Soil Tests Indicate Potash Levels
L-3-44 South Finds Clovers Excell in Profits
M-4-44 The Importance of Potash in Maintaining Food Production in N. C.
N-4-44 The Potash Problem in Illinois
P-4-44 Borax Sprayed on Beets Controls Black Spot
R-5-44 More About Soybean Fertilization
S-5-44 Borax Spray for Turnips
T-5-44 Southern Crops Show Need of Potash
U-5-44 The Use of Fertilizer in Maryland
W-6-44 Fertilizer Requirements for Permanent Pastures in Alabama
X-6-44 Soil Management for Cannery Peas
Y-6-44 Sweet Clover Responds to Potash Fertilizer
Z-6-44 Our Fertilizers Need Magnesium
AA-8-44 Florida Knows How to Fertilize Citrus
BB-8-44 Potash for War Food
CC-8-44 Soil Fertility's Effect on Asparagus
DD-8-44 Keeping Soil Fertile in the Pecan Orchard
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HH-10-44 Producing a Record Potato Yield
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D-1-45 Fertilizers Pay Their Way in Western Washington
E-1-45 Bigger Yields from Fertilizers
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G-2-45 Some Whys and Wherefores for Air-Conditioning Soils
H-2-45 Can We Keep Cotton in N. C. Agriculture?
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THE AMERICAN POTASH INSTITUTE

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And then there was the young lady who asked her suitor: "When we get married I'm going to cook, sew, darn your socks, and lay out your pipe and slippers. What more can any man ask than that?"

"Nothing," replied the suitor, "unless he's evil-minded."

Love is one game that is never postponed on account of darkness.

TONGUE-TIED

After giving the private a dressing-down for being so late in returning the supplies, the sergeant demanded: "Okay, let's hear how it happened, Miller."

"Well, I picked up a chaplain along the road," explained the woebegone rookie, "and from then on the mules couldn't understand a word I said."

Salesman: "Boy, O boy, did Tillie throw a party last night!"

Girl: "You don't say! Who all was there?"

Salesman: "Just me and Tillie."

And then there was the fellow who gave up drinking for the sake of the wife and kidneys.

Gob: "I'm a man of few words. Will you kiss me or won't you?"

Girl: "Well, I wouldn't ordinarily, but you've talked me into it."

TEACHING A CALF TO DRINK

The hardest thing on a ranch, I think,
Is trying to teach a calf to drink.
You pull and haul, get his head in a pail;
He'll stand there and twist and wiggle his tail;
And the very first thing, kerplunk! goes his nose,
And most of the milk goes over your clothes.

Hang on to your patience, your teeth you can grit;
If you can't hold your temper you might as well quit.
For old Mother Nature whose methods don't fail
Never meant for a calf to drink out of a pail.
Back him into a corner, straddle his neck;
He won't damage you much, you're already a wreck.

Just give him a finger, and maybe with luck
That little old calf will start in to suck.
Pick up your bucket and push his head down,
Then away you go again, around and around.
Just do this a week with your back in a kink,
And maybe by then you'll teach him to drink!

—*Author Unknown.*

Mary had a little wolf
She fleeced him white as snow. . . .

Need for—

BORON IN AGRICULTURE

Authorities have recognized that the depletion of Boron in soil has been reflected in limited production and poor quality of numerous field and fruit crops.

Outstanding results have been obtained with the application of Borax in specific quantities or as part of the regular fertilizer mix, improving the quality and increasing the production of alfalfa and other legumes, table beets, sugar beets, apples, etc.

The work of the State Agricultural Stations and recommendations of the County Agents are steadily increasing the recognition of the need for Boron in agriculture. We are prepared to render every practical assistance.

Borax is economical and very little is required. It is conveniently packed in 100 lb. sacks and stocks are available for prompt delivery everywhere in the United States and Canada. Address your inquiries to the nearest office.

PACIFIC COAST BORAX COMPANY

NEW YORK CHICAGO LOS ANGELES

BORAX

for agriculture

20 Mule Team. Reg. U. S. Pat. Off.

It's the *know-how* that counts

TO COMMEMORATE the 50th anniversary of V-C Fertilizers, the esteemed wife of one of our long-time V-C customers recently sent us the finest birthday cake we ever received. As we enjoyed each delicious slice, the thought occurred to us that —in making a better cake, growing a better crop, or manufacturing a better fertilizer—*it's the know-how that counts!*

Give two people or two companies similar facilities and equipment, the same recipe or formula and equally-good ingredients—one will develop a quality product, while the other produces a disappointing result.

When it comes to manufacturing better fertilizers, V-C has the *know-how*. During the last 50 years, V-C Fertilizers have brought more and more crop-producing power to the farms of increasing thousands of V-C customers. Today V-C Fertilizers are helping to grow Victory Crops. Tomorrow, when Victory is won, V-C *know-how* will continue to provide a better and better V-C Fertilizer for every crop on every soil on every farm.

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VC FERTILIZERS

Protecting Seed from Soil-borne and Seed-surface Fungi

County agents were quick to recognize the importance of protecting seed against fungi that cause decay, with a resulting decrease in stands and yields. Practically all soils contain such destructive fungi.

Among the chemicals that have proved most effective in reducing seed decay is Spergon. Booklets are now available reporting on tests with Spergon on the following crops:

PEAS
LIMA BEANS
SWEET CORN
FIELD CORN
SORGHUM
PEANUTS
SOYBEANS

Send for your complimentary copies of these reports now. You will find them helpful.

TYPICAL DOSAGES

Corn	1½ oz. per bu. seed
Peas	2 oz. per bu. seed
Beans (including Limas)	2 oz. per bu. seed
Soybeans	2 oz. per bu. seed
Sorghum	1½ oz. per bu. seed
Flax	2 oz. per bu. seed
Peanuts	3 oz. per 100 lbs. seed

ADVANTAGES OF SPERGON

- Safe to use—cannot harm delicate seeds, even when used in excess.
- Safe for user—non-poisonous and non-irritating to those applying it to seed.
- Long lasting—Spergon does not deteriorate with age; may be applied months in advance of planting.
- Self-lubricating. No graphite needed in drill.
- Compatible with legume inoculants.

Spergon

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Save That Soil

A 16mm., sound, color film depicting the early South, the results of the one-crop system, and the reclamation and conservation of Southern soils through the use of legumes and modern methods of soil management.
Running time, 28 min. (on 1200-ft. reel).

Other 16MM. COLOR FILMS AVAILABLE

- Potash in Southern Agriculture
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- Potash Deficiency in Grapes and Prunes
- New Soils from Old
- Potash Production in America

We shall be pleased to loan any of these films to agricultural colleges and experiment stations, county agricultural agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible) and period of time of loan.

For additional information write:

AMERICAN POTASH INSTITUTE, INC.
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